
100 JavaScript Tasks
with solutions
By
Adam
Higherstein

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Programming Exercises with Solutions!

Learning by doing!

Language now: JavaScript

Free book
This is the first version

Pls, give comments, feedback, new ideas to the 2. version!!

Comments can be sent to:
darry.robinson@gmail.com

Thank You!

Introduction

Try to do tasks first yourself without checking solutions!

Ask if you have problems.

And finally check right solutions!

Check also author's YT Channel:
https://www.youtube.com/@adamhigherstein8986/videos

Tool that we use in this tutorial:
Notepad++ and web browser

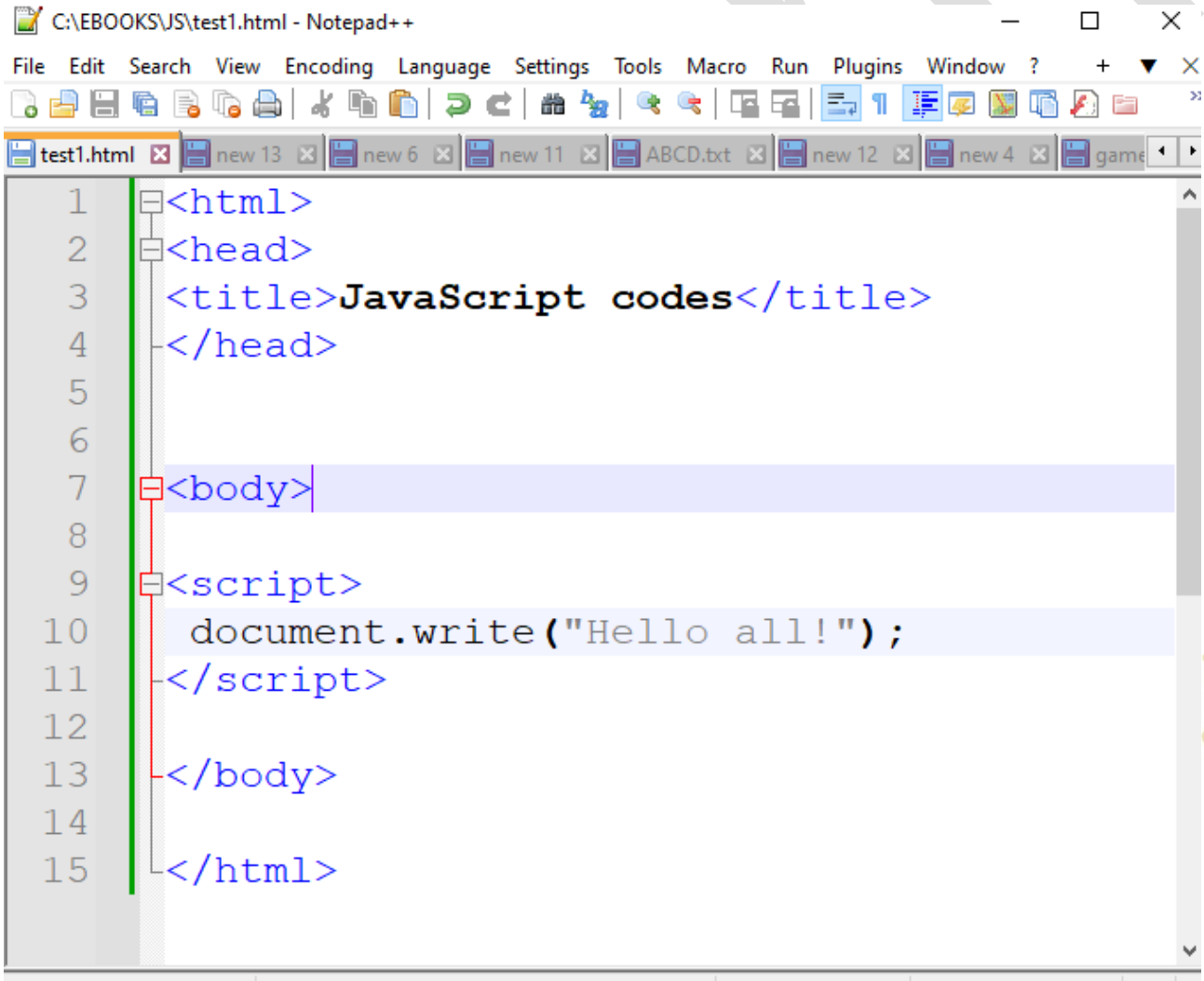
SET 1: Tool & basics

Topics:
Installation of programming tool.
Testing installation with ”Hello world!” classic code.
Then we discuss variables and datatypes...

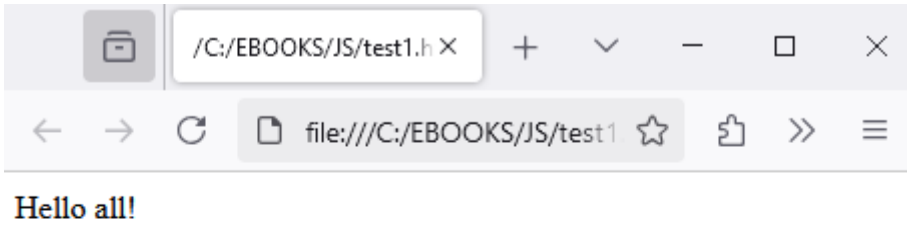
Task 1

Let's try our tools. It is good to create a folder for example codes. Notepad++ is good but of course you can use some other text editor, e.g. Visual Studio Code.

Here is JS code that prints Hello, all!



This is the output:



Task 2

Define suitable variables for these values:

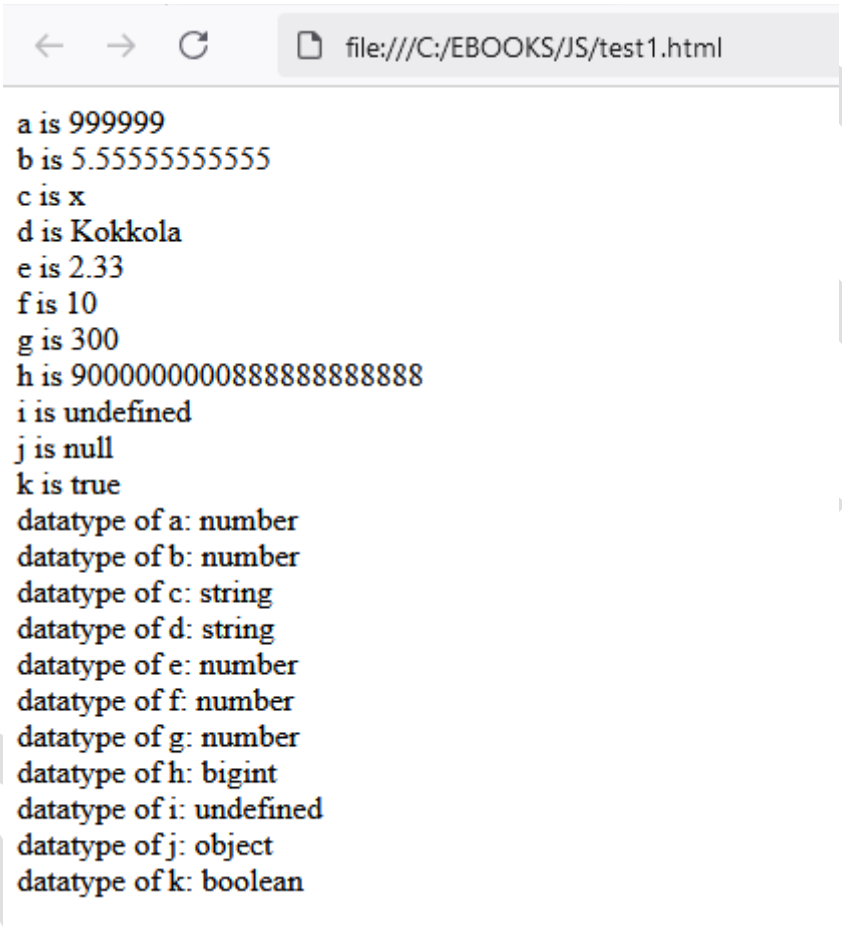
a) 999999
a) b) 5.55555555555
b) c) 'x'
c) e) 2.33
d) f) 10
e) g) 300
f) h) 9000000000888888888888n
g) i)
h) h) null
i) i) true

Solution
This is now easy because the datatype of the variable depends on the assigned value.
It is also possible to define the datatype beforehand by using functions.

```
<script>
var a = 999999;
var b = 5.55555555555;
var c = 'x';
var d = "Kokkola";
var e = 2.33;
var f = 10;
var g = 300;
var h = 9000000000888888888888n;
var i;
var j = null;
var k = true;

 document.writeln("a is " + a + "<br>");
 document.writeln("b is " + b + "<br>");
 document.writeln("c is " + c + "<br>");
 document.writeln("d is " + d + "<br>");
 document.writeln("e is " + e + "<br>");
  document.writeln("f is " + f + "<br>");
 document.writeln("g is " + g + "<br>");
 document.writeln("h is " + h + "<br>");
 document.writeln("i is " + i + "<br>");
 document.writeln("j is " + j + "<br>");
 document.writeln("k is " + k + "<br>");

  document.writeln("datatype of a: " + typeof(a) + "<br>");
  document.writeln("datatype of b: " + typeof(b) + "<br>");
  document.writeln("datatype of c: " + typeof(c) + "<br>");
  document.writeln("datatype of d: " + typeof(d) + "<br>");
  document.writeln("datatype of e: " + typeof(e) + "<br>");
  document.writeln("datatype of f: " + typeof(f) + "<br>");
```

```
  document.writeln("datatype of g: " + typeof(g) + "<br>");
  document.writeln("datatype of h: " + typeof(h) + "<br>");
  document.writeln("datatype of i: " + typeof(i) + "<br>");
  document.writeln("datatype of j: " + typeof(j) + "<br>");
  document.writeln("datatype of k: " + typeof(k) + "<br>");

</script>
```

Result



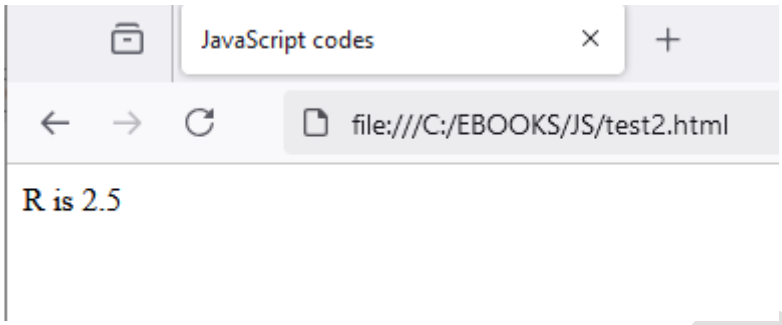
Task 3

Our programs uses Ohm's law to calculate the resistance.
Voltage and current are given.

Solution

```
<script>
var U = 50;
var I = 20;
var R = U/I;
document.write("R is " + R);
</script>
```

Test run



Task 4

User gives the speed of the car (km/h) and the distance (km). Program calculates amount of time.
a) in hours
b) in whole hours and minutes

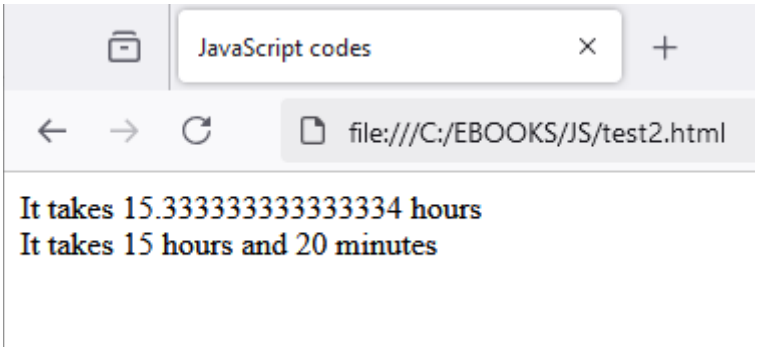
Solution
a)

```
var v = 75;
var s = 1150;
var  t = s/v;
document.write("It takes " + t + " hours <br>");
```

b)

```
var whole_hours = parsevar(t);
var minutes = (parsevar)((t - whole_hours) * 60);
document.write("It takes " + whole_hours + " hours and "
+ minutes + " minutes");
```

Test run



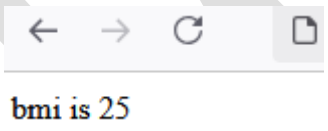
Task 5

Our program calculates BMI. Weight and height are given.

Solution

```
var height_cm = 200;  // cm
var weight = 100;  // kg

var height_m = height_cm/100;
var bmi = weight/(height_m * height_m);

document.write("bmi is " + bmi + "<br>");
```

Test run



Task 6

Create a euro converter: dollars to euros.

Solution
we can take the current exchange value now:

1 USD to EUR - US Dollars to Euros Exchange Rate

+4.48%. (1Y). **1 USD = 0.959589 EUR**. Nov 23, 2024, 17: ...

```
var dollars = 200;
var current_coeff = 0.9595;
var euros = current_coeff * dollars;
document.write("sum is " + euros);
```

Task 7

Convert seconds to hours, minutes, seconds.

Solution

```
var allSeconds = 123456;
var hours = Math.floor(allSeconds / 3600);  // hours is  34
allSeconds = allSeconds - hours * 3600;  // allSeconds is  1056
var minutes = Math.floor(allSeconds/60);  // minutes 17
var seconds = allSeconds - minutes *  60; // 36 seconds
document.write("Hours: " + hours + " minutes: " + minutes
  + " and seconds: " + seconds);
```

Task 8

Convert euros to 5, 10, 20, 50, 100, 200, 500 euros bills.

Solution

```
var euros = 1234;
var b500 = Math.floor(eeuros/500);  // 2
euros = euros - b500*500; // 234
var b200 = Math.floor(euros/200);  // 1
euros = euros - b200*200; // 34
var b100 = Math.floor(euros/100);  // 0
euros = euros - 100*100; // 34
var b50 = Math.floor(euros/50);  // 0
euros = euros - b50 * 50; // 34
var b20 = Math.floor(euros/20); // 1
euros = euros - b20*20; // 14
var b10 = Math.floor(euros/10);  // 1
var b5 = euros - b10*10; // 0
var remainingEuros = euros - b5*5;  // 4
```

SET 2: Decision making

Topics:
decision making, branching, if else

Task 9

User gives a value and our program tells if the value is > 100 or not.

```
var x = 55;

if (x > 100)
   document.write("It is over 100 ");
else
  document.write("It is not over 100 ");
```

Task 10

Write a program that reads two vareger values.
If the first is less than the second, prvar the message "up".
If the second is less than the first, prvar the message "down ".
If the numbers are equal, prvar the message "equal".

Solution

```
var a = 3;
var b = 4;

if (a < b)
 document.write("up");
else if (a > b)
 document.write("down");
else
 document.write("equal");
```

Task 11

User enters a weekday number and the program tells the name of the day in Germany.

Solution

```
var nro = 4;
if (nro == 1)
  document.write("Montag  ");
else if (nro == 2)
  document.write("Dienstag  ");
else if (nro == 3)
 document.write("Mittwoch  ");
else if (nro == 4)
 document.write("Donnerstag  ");
else if (nro == 5)
  document.write("Freitag  ");
else if (nro == 6)
  document.write("Samstag  ");
else if (nro == 7)
  document.write("Sonntag  ");
else
  document.write("Not a suitable nr  ");
```

Task 12

Program solves a quadratic equation
Note: you have to include math.h to your source file and then use sqrt() function.

Solution

```
var a, b, c;
a = 4;
b = 5;
c = 4;
var x1, x2;
var diskr;

diskr = b*b - 4 * a * c;
if (diskr < 0)
 document.write("No real roots  ");
else
{
 x1 = (-b + Math.sqrt(diskr))/(2*a);
 x2 = (-b - Math.sqrt(diskr))/(2*a);
 document.write("x1 = " +  x1);
 document.write("x2 = " + x2);
}
```

Task 13

User gives a month number and our program tells the number of days in that month.

Solution

```
var kk = 5;

if (kk == 4 || kk == 6 || kk == 9 || kk == 11)
 document.write("30  ");
else if (kk == 2)
 document.write("28/29  ");
else
 document.write("31  ");
```

Task 14

User gives the lengths of the triangle's sides. Program tells what is the triangle like and calculates the area of the triangle

We may have these types
Equilateral triangle

Isosceles triangle

Right angled triangle

Normal triangle

Solution

```
var a, b, c;
a = 3,
b = 4;
c = 5;

if (a == b && a == c)
   document.write("Equilateral triangle  ");
       else if (a == b || a == c || b == c)
         document.write("Isosceles triangle  ");
       else if (a*a + b*b == c*c  || a*a + c*c == b*b || b*b +
         c*c == a*a )
          document.write("Right angled triangle  ");
       else
         document.write("Basic triangle  ");

var s = (a + b + c)/2;
var tempvalue = s*(s-a)*(s-b)*(s-c);
var area = Math.sqrt(tempvalue);

document.write("Area is " + area);

// Heron's formula is used for the area
// area =  Math.sqrt(s*(s-a)*(s-b)*(s-c))
// s = (a + b + c)/2
```

Task 15
Create a program: what is the biggest of 3 given values?

Solution

```
// Method 1
var p1 = 4; var p2 = 6; var p3 = 8;
if (p1 > p2)
  if (p2 > p3)
     document.write("Biggest is 2 + p1);
  else
       if (p3 > p1)
       document.write(""Biggest is " + p3);
```

```
      else
      document.write(""Biggest is " + p1);
else
if (p2 > p3)
      document.write(""Biggest is " +  p2);
else
      document.write(""Biggest is " + p3);
```

// Method 2

```
 if (p1 > p2 && p2 > p3)
    document.write(""Biggest is  " + p1);
 else if (p2 > p1 && p2 > p3)
            document.write(""Biggest is on " +  p2);
         else
           document.write(""Biggest is on  +  p3);
```

// Method 3

```
var biggest = p1;
if (p2 > biggest)
   biggest = p2;
if (p3 > biggest)
   biggest= p3;
 document.write(""Biggest is  + biggest);
```

SET 3: Loops

Topics:
Loops: for, while, do while

Task 16

Program calculates the sum of values 1 - 5.
Use: for, while and do-while

Solution

```
// for
 var sum = 0;
var p;
for (p = 1; p <= 5; p++)
{
      sum += p;
}

document.write("sum is  "+ sum);

// while
sum = 0;
p = 1;
while (p <= 5)
{
      sum += p;
      p++;
}

document.write("sum on "+ sum);

// do while
sum = 0;
p = 1;
do
{
      sum += p;
      p++;
}
while (p <= 5);

document.write("sum on "+ sum);
```

Task 17

Program calculates the sum of even numbers between 2 - 40.
Use: for, while and do-while

Solution

```
// for
 var sum = 0;
 var p;
 for (p = 2; p <= 40; p += 2)   // p = p + 2;
 {
       sum += p;
 }

 document.write("sum is  "+ sum);

// while
 sum = 0;
 p = 2;
 while (p <= 40)
 {
       sum += p;
       p += 2;
 }

 document.write("sum on "+ sum);

// do while
 sum = 0;
 p = 2;
 do
 {
       sum += p;
       p += 2;
 }
 while (p <= 40);

 document.write("sum on "+ sum);
```

Task 18

Program calculates sum: 5, 10, 15, .. 100.
Use: for, while and do-while

Solution

```
//      for
var sum = 5;
var p;
for (p = 5; p <= 100; p += 5)  // p = p + 5;
{
      sum += p;
}

document.write("sum is  "+ sum);

// while
sum = 5;
p = 5;
while (p <= 100)
{
      sum += p;
      p += 5;
}

document.write("sum on "+ sum);

// do while
sum = 5;
p = 5;
do
{
      sum += p;
      p += 5;
}
while (p <= 100);

document.write("sum on "+ sum);
```

Task 19

Program generates 50 random numbers (between 1 to 10) and calculates sum and average.

Solution

```
var sum = 0;
var i;
for (i = 0; i < 50; i++)
{
 var min = 1;
 var max = 10;
 var x = Math.floor(Math.random() * (max - min)) + min;
 sum = sum + x;
}

document.write("sum is  "+ sum);
var aver = sum/50;
document.write("<br>");
document.write("average is "  + aver);
```

Task 20

Program throws dice 100 times and tells amounts of different values (1, 2, 3, 4, 5, and 6).

Solution

```
var n1 = 0;  var n2 = 0;  var n3 = 0;
 var n4 = 0;  var n5 = 0;  var n6 = 0;

 var i;
 for (i = 0; i < 10000; i++)
 {
   var min = 1;
   var max = 6;
   var x = Math.floor(Math.random() * max) + min;

     switch (x)
     {
          case 1: n1++; break;
          case 2: n2++; break;
          case 3: n3++; break;
          case 4: n4++; break;
          case 5: n5++; break;
          case 6: n6++; break;
     }
}
```

```
document.write("1: "+ n1);
document.write(" 2: "+ n2);
document.write("  3: "+ n3);
document.write("  4: "+ n4);
document.write("  5: "+ n5);
document.write("  6: "+ n6);
```

Task 21

Create an account manager with menu:
User can make deposits
Do withdrawal
Check the balance

Create a menu
take money
add money
check balance
exit

Solution

```
var saldo = 999;

while (1)
{
 system("cls");
 document.write("Menu  ");
 document.write("1 ==> Take money  ");
 document.write("2 ==> Add money  ");
 document.write("3 ==> Check balance  ");
 document.write("0 ==> Lopeta ");

 var v = 9;
 document.write("Your choice? ");
 scanf("%d", &v);

 if (v == 1)
 {
       var sum;
       document.write("Give the sume:  ");
       scanf("%d", &sum);
       if (sum <= saldo)
       {
           saldo -= sum;
           document.write("Balance is now "+ saldo);
```

```
        }
        else
        {
            document.write("Not enough money  ");
       document.write("Push any key to go on... ");
              getchar(); getchar();
         }
 }

 if (v == 2)
 {
       var summa;
       document.write("Give the sum:  ");
       scanf("%d", &summa);
      saldo += summa;
      document.write("Balance is "+ saldo);
       document.write("Push any key to go on... ");
       getchar();getchar();
}

if (v == 3)
 {
       document.write("Balance is "+ saldo);
       document.write("Push any key to go on... ");
    getchar();getchar();
    }

if (v == 0)
 {
       break;
    }

}
```

Note:
Variable for account balance has to be global!
=> declare it outside (above) the while loop
When user takes money you have to check if there is enough money...

Task 22

Try to solve this equation:
$3x^3 - 4x^2 + 9x + 5 = 0$
Here ^ means exponent

Solution

```
        var x, y;

      for (x = -5; x < 5; x += 0.0001)
       {
             y = 3*x*x*x  - 4*x*x + 9*x + 5;
             if (y > -0.001 && y < 0.001)
               break;
       }

       document.write("x: ", x);
       document.write(" y: ", y);
```

Task 23

Print this kind shape: character and amount of rows are given.

o
oo
ooo
oooo
ooooo
oooooo

and so on.

Solution

```
var merkki = 'x';
    var rivit = 20;
    var i;
    var j;

    for (i = 1; i <= rivit; i++)
    {
     for (j = 0; j < i; j++)
        document.write("" + merkki);

     document.write("<br>");
     }
```

Output

```
x:
xx
xxx
xxxx
xxxxx
xxxxxx
xxxxxxx
xxxxxxxx
xxxxxxxxx
xxxxxxxxxx
xxxxxxxxxxx
xxxxxxxxxxxx
xxxxxxxxxxxxx
xxxxxxxxxxxxxx
xxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxx
```


Task 24

Create this kind of shape: amount is given by the user

```
o
oo
ooo
oooo
```

ooooo
oooooo
ooooooo
oooooooo
ooooooooo
oooooooo
ooooooo
oooooo
ooooo
oooo
ooo
oo
o

Solution

```
var main()

    var n = 10;
    var i;
    var j;
    for (i = 0; i < n; i++)
    {
      for (j = 0; j <= i; j++)
      document.write("o");

      document.write("<br>");
    }
    for (i = n; i >= 0; i--)
    {
      for (j = 0; j <= i; j++)
      document.write("o");

      document.write("<br>");
    }
```

Output

o
oo
ooo
oooo
ooooo
oooooo
ooooooo
oooooooo
ooooooooo
oooooooooo
ooooooooooo
oooooooooo
ooooooooo
oooooooo
ooooooo
oooooo
ooooo
oooo
ooo
oo
o

Task 25

Generate a lotto row.
Rules: Select seven numbers from 1 to 40

Solution

Method 1 (funny way, a lot of computer work :))

```
var n1 = 0, n2 = 0, n3 = 0, n4 = 0, n5 = 0, n6 = 0, n7 = 0;

 while (true)
 {
  n1 = Math.floor(Math.random() * 40) + 1;
   n2 = Math.floor(Math.random() * 40) + 1;
   n3 = Math.floor(Math.random() * 40) + 1;
   n4 = Math.floor(Math.random() * 40) + 1;
   n5 = Math.floor(Math.random() * 40) + 1;
   n6 = Math.floor(Math.random() * 40) + 1;
   n7 = Math.floor(Math.random() * 40) + 1;

   if (n1 != n2 && n1 != n2 && n1 != n3 && n1 != n4 && n1 != n5
   && n1 != n6 && n1 != n7 && n2 != n3   && n2 != n4  && n2 != n5
      && n2 != n6   && n2 != n7
      && n3 != n4  && n3 != n5  && n3 != n6 && n3 != n7
      && n4 != n5  && n4 != n6  && n4 != n7
       && n5 != n6   && n5 != n7
         && n6 != n7)
         break;

 }


 document.write("  " + n1 + ", " + n2 + ", " + n3 + ", " + n4 + ",
" + n5 + ", " + n6 + ", " + n7);
```

Output

25, 8, 39, 16, 38, 12, 19

Way 2

```
var nros  = [0,0,0,0,0,0,0];

 var i;
 for (i = 0; i < 7; i++)
 {

    var existed_already = 0;
    var newnr = Math.floor(Math.random() * 40) + 1;
    var j;
    for (j = 0; j <= i; j++)
    {
        if (nros[j] == newnr)
        {
              existed_already = 1;
              break;
      }
     }

     if (existed_already == 1)
       { i--; nros.pop();}

     else
     {
        nros[i] = newnr;

     }

     }

  for (i = 0; i < 7; i++)
{
    document.write(" " + nros[i]);
}
```

Task 26

Calculate factorial and amount of combinations.

Solutions

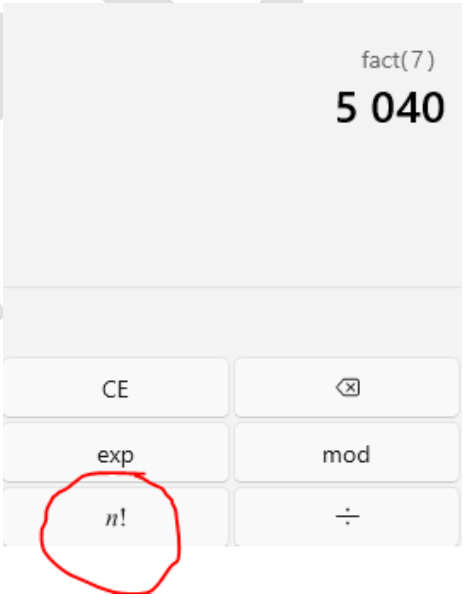
Factorial

```
// factorial
/*
0! = 1
n! = 1 * 2 * ... * n
```

```
*/

var f = 1;
var i;
// now  factorial of 7
var n = 7;
if (n == 0)
  f = 1;
else
for (i = 1; i <= 7; i++)
{
 f = f * i;
}

document.write("factorial of " + n + " is " + f);
```

```
factorial of 7 is 5040
```

Calculator check:



Task 27

Create a program that calculates amount of combinations

Combinations theory first:

```
// combinations
// amount = n!/k*(n-k)!
// n is the whole population
// k is the sample
```

Solution

```
var n, k, amount;

n = 5;
k = 3;

var i;

var    n_fact = 1;

for (i = 1; i <= n; i++)
  n_fact = n_fact * i;

var k_fact = 1;

for (i = 1; i <= k; i++)
  k_fact = k_fact * i;


   var diff_fact = 1;

for (i = 1; i <= n-k; i++)
  diff_fact = diff_fact * i;

amount = n_fact/(k_fact*diff_fact);

document.write("amount is "+ amount);

  /*
  illustration
  the whole population could be "abcde", so n is 5
  samples are then
          abc
          abd
```

```
        abe

        acd
        ace
        ade

        bcd
        bde
        bce

        cde

   answer is    10      combinations
*/
```

SET 4: Arrays

Task 28

Create a program that
a) fills an array with random numbers
b) print an array
c) calculates the sum
d) finds the max and min
e) finds a spesific values

Solution

```
var vals = [];
        var i;
        for (i = 0; i < 5; i++)
        {
                vals[i] = Math.floor(Math.random() * 100) + 1;
        }


        // print
        for (i = 0; i < 5; i++)
        {
           document.write(" " + vals[i]);
        }

        // min
        var min = vals[0];
```

```
for (i = 0; i < 5; i++)
{
 if (vals[i] < min)
    min = vals[i];
}

 document.write("<br>");
 document.write("min is " + min);


// max
var max = vals[0];
for (i = 0; i < 5; i++)
{
 if (vals[i] > max)
    max = vals[i];
}
document.write("<br>");
 document.write("max is " + max);

// search
// we put there some value that we then know it exits
vals[3] = 99999;
var x = 99999;
var result = -1;
for (i = 0; i < 5; i++)
{
        if (x == vals[i])
        {
                result = i;
                break;
        }
}

if (result == -1)
  document.write("Not found:(   ");
else
  document.write("Found, location is" + result);
```


Task 29

Create a program that multiplies array values with given value.

Solution

```
for (i = 0; i < 5; i++)
```

```
{
 vals[i] = 2 * vals[i];
}


// print
for (i = 0; i < 5; i++)
{
    document.write(" " + vals[i]);
}
```

Task 30

Create a program that
calculates the sum of 2 array values to 3. array.

Solution

```
var vals1 = [2,3,444,5,6];
var vals2 = [1,1,1,1,1];
var sums = [];
for (i = 0; i < 5; i++)
{
 sums[i] = vals1[i] + vals2[i];
}

document.write("<br>");
document.write("<br>");
for (i = 0; i < 5; i++)
{
    document.write(" " + sums[i]);
}
```

Task 31

Create a program that fills and prints a 3x4 array,

Solution

```
var matr = [];
var rows = 3;
var cols = 4;


for (var i = 0; i < rows; i++) {
```

```
matr[i] = [];
for (var j = 0; j < cols; j++) {
  matr[i][j] = j;
 }
}

  for (i = 0; i < 3; i++)
  for (j = 0; j < 4; j++)
         matr[i][j] = Math.floor(Math.random() * 100);

  // basic output
  for (i = 0; i < 3; i++)
  for (j = 0; j < 4; j++)
         document.write(" "+ matr[i][j]);

 // arraylike output
 document.write("<br>");
 for (i = 0; i < 3; i++)
 {
  for (j = 0; j < 4; j++)
         document.write(" " +matr[i][j]);

   document.write("<br>");
  }
```

Task 32

Create a program that contains an array that has this structure column contains a year 1. column contains the population of the world Put there some 5 rows.
Prvar it.
Search the population of some year.

from https://en.wikipedia.org/wiki/World_population

we get this info

1,1804,
2,1927,
3,1960,
4,1974,
5,1987,
6,1999,
7,2011,
8,2022,

9,2037,
10,2057

Solution
// population

```
var pops = [
        [1,1804],
        [2,1927],
        [3,1960],
        [4,1974],
        [5,1987],
        [6,1999],
        [7,2011],
        [8,2022],
        [9,2037],
        [10,2057],
        ];


         for (i = 0; i < 10; i++)
        for (j = 0; j < 2; j++)
        document.write(" "+ pops[i][j]);


        var year = 2011;
        for (i = 0; i < 10; i++)
        if (pops[i][1] == year)
                {
                 document.write(" population = "+ pops[i][0]);
                        break;
                        }
```

Task 33

Create a program that contains an array that has this structure
row 1 contains the population of some country
row 2 contains the area of that country
column 5 is empty or has value 0
Calculate the population density to 5. column

Some info about orthern countries, we take finland and
Sweden with now

Country	Inhabitants	Area
Denmark	5,806,014	42,933
Finland	5,520,535	338,424
Norway	5,323,933	385,203
Sweden	10,313,447	450,295

```
var info =
 [["Denmark", 5806014,       42933,0],
  [ "Finland",  5520535,      338424,0],
  [ "Norway",          5323933,       385203,0],
 [  "Sweden",          10313447,     450295,0]
  ];


          for (i = 0; i < 4; i++)
          {
          for (j = 0; j < 4; j++)
            document.write(" "+ info[i][j]);
                  document.write("<br>");
                  }

    for (i = 0; i < 4; i++)
          info[i][3] = Math.round(info[i][1]/info[i][2]);

          document.write("<br>");

  for (i = 0; i < 4; i++)
          {
          for (j = 0; j < 4; j++)
```

```
    document.write("    "+ info[i][j]);
  document.write("<br>");
        }
```

Task 34

Create a program that contains an array that has this structure and values.

1,5,6,6,7,7,
2,4,6,8,8,8,
3,5,5,8,6,8,
4,9,6,8,5,8,
5,7,6,7,8,10

1. column is the order of measurement set Columns 2-6 contain measurement values
Search for the biggest average of those measurement sets

Solution

```
var measures =
[[1,5,6,6,7,7],
[2,4,6,8,8,8],
[3,5,5,8,6,8],
[4,9,6,8,5,8],
[5,7,6,7,8,10]];

var sums = [0,0,0,0,0];

var i, j;
for (i = 0; i < 5; i++)
 for (j = 1; j < 6; j++)
   sums[i] = sums[i] + measures[i][j];

for (i = 0; i < 5; i++)
  document.write("  "+ sums[i]);

var avers = [];
for (i = 0; i < 5; i++)
  avers[i] = sums[i]/5.0;

document.write("<br>");
for (i = 0; i < 5; i++)
  document.write(" " +  avers[i]);
```

```
    document.write("<br>");
    var max = avers[0];
    for (i = 0; i < 5; i++)
      if (avers[i] > max)
         max = avers[i];

document.write("<br>");
document.write("Max. average is " + max);
```

Task 35

Your array has these values
1, 2, 5, 8, 4, 2, 3, 22, 33, 11, 0, 5

Write a program that tells how many values are bigger than 10.

Solution

```
var vals =  [1, 2, 5, 8, 4, 2, 3, 22, 33, 11, 0, 5];

var over10 = 0;
var i;
for (i = 0; i < 12; i++)
     if (vals[i] > 10)
          over10++;

   document.write("Over 10: " + over10);
```

Task 36

Create a program that contains an array that contains 8 measurements.
Calculate the standard deviation. Compare the result to Excel result.

Solution

```
var meas = [1.1, 1.5, 1.7, 2, 2.6, 2.4, 3.5, 4.5];
var aver, sum;
sum = 0.0;
for (i = 0; i < 8; i++)
   sum += meas[i];

document.write("sum = " + sum);

document.write("<br>");

aver = sum/8;
```

```
document.write("aver = " + aver);
document.write("<br>");

var temp_value = 0;

for (i = 0; i < 8; i++)
   temp_value = temp_value + (meas[i] - aver) * (meas[i] -
                aver);

var std = Math.sqrt(temp_value/7);

document.write("std is " + std);
```

37

SET 5: Functions

Task 37

Create a function that:
Calculates the sum of 2 integers and prints out the result.

Solution

```
<head>
<title>JavaScript codes</title>

<script>
function print_values( a, b)
{
    document.write(" " + a + ", " +  b);
}

</script>
</head>

<body>

<script>
 print_values.call(this,5,6);
 </script>

</body>
```

Task 38

Create a function that:
Returns the sum of 2 integers

Solution

```
function calc_sum(a, b)
{
    return (a + b);
}
```

Task 39

Create a function that:
Returns the average of 2 íntegers

Solution

```
function calc_aver(a, b)
{
     return (a + b)/2;
}
```

Task 40

Create a function that:
Returns the average of 4 values.

Solution

```
function calc_aver4(a, b, c, d)
{
     return (a + b + c + d)/4;
}
```

Task 41

Create a function that:
Returns the factorial.

Solution

```
function fact(n)
{
    var f = 1;
    var i;

    if (n == 0)
      f = 1;
    else
    for (i = 1; i <= 7; i++)
    {
     f = f * i;
    }

    return f;
}
```

Task 42

Create a function that:
Returns bigger of 2 integers.

Solution

```
function bigger(a, b)
{
     if (a > b)
       return a;
     else
       return b;
}
```

Task 43

Create a function that:
Returns the biggest of 3 varegers.

Solution

```
function biggest_of_3(a, b, c)
{
     var max;
     if (a > b && a > c)
       max = a;
     else if (b > a && b > c)
       max = b;
     else
       max = c;

     return max;
}
```

Note: there are more solutions than one...

Task 44

Create a function that:
Converts inches to centimeters.

Solution

```
function inches_to_cm(inches)
{
     return 2.54 * inches;
```

```
}
```

Task 45

Create a function that:
Returns the BMI.

Solution

```
function bmi(w_kg, h_cm)
{
   var bmi =   w_kg/(h_cm/100*h_cm/100);
   return bmi;
}
```

Task 46

Create a function that:
Function returns the biggest of 5 integers.

Solution

```
function biggest_5(a,  b,  c,  d,  e)
{
     var maks = a;
     if (b > maks)
       maks = b;
     if (c > maks)
       maks = c;
     if (d > maks)
       maks = d;
     if (e > maks)
       maks = e;

     return maks;
}
```

Task 47

Program with functions calculates amount of combinations.

```
function fact( p)
{
```

```
    var kert = 1;
    var i;
    for (i = 1; i <= p; i++)
    {
     kert = kert * i;
    }

    return kert;
}

function kombin(n, k)
{
    var tulos = fact(n)/(fact(n-k) * fact(k));
    return tulos;
}
```

Task 48

Function prints out a lotto row.

Solution

```
function lotto()
{

   var nros  = [0,0,0,0,0,0,0];

   var i;
   for (i = 0; i < 7; i++)
   {

      var existed_already = 0;
      var newnr = Math.floor(Math.random() * 40) + 1;
      var j;
      for (j = 0; j <= i; j++)
      {
          if (nros[j] == newnr)
          {
                existed_already = 1;
                break;
        }
       }

       if (existed_already == 1)
         { i--; nros.pop();}

       else
```

```
        {
           nros[i] = newnr;

        }

        }

     for (i = 0; i < 7; i++)
    {
       document.write(" " + nros[i]);
    }


}
```

Task 49

Program with functions calculates the standard deviation.

Solution

```
function std()
{
     var meas = [1.1, 1.5, 1.7, 2, 2.6, 2.4, 3.5, 4.5];
     var aver, sum;
     var i;

     for (i = 0; i < 8; i++)
        sum += meas[i];

    aver = sum/8;

    var temp_value = 0;

    for (i = 0; i < 8; i++)
        temp_value = temp_value + (meas[i] - aver) *
        (meas[i] - aver);

     var std = Math.sqrt(temp_value/7);

      document.write("std is ", std);
   */


}
```

Task 50

Program with functions calculates the sum on an array.

Solution

```
function sum_of_array(array, n)
{
     var sum = 0;
     var i;
     for (i = 0; i < n; i++)
     {
      sum += array[i];
     }
     return sum;
}
```

call

```
  var vals = [3,4,5,2,1];
  var n = 5;

  var sum = sum_of_array.call(this,vals, n);
  document.write("sum is " + sum);
```

Task 51

A character is passed to a function: funtion returns True if character is a vowel, otherwise False (0).
(Five of the 26 alphabet letters are vowels: A, E, I, O, and U.)

Solution

```
function  is_vowel(c)
{
        var result = 0;
        switch (c)
        {
                case 'a': result = 1; break;
                case 'e': result = 1; break;
                case 'i': result = 1; break;
                case 'o': result = 1; break;
                case 'u': result = 1; break;
  }

        return result;
```

}

Task 52

A whole number and an array (size is 5, contains varegers) are passed to
a function that checks how many times passed value exists in that passed array and returns the amount.

Solution

```
function amount_of_val(vals, n, x)
{
     var amount = 0;
     var i;
     for (i = 0; i < n; i++)
     {
      if (vals[i] == x)
        amount++;
     }

     return amount;

}
```

Task 53

Your program defines and fills an array of 10 integers with random numbers that are between 1-5.
That array is passed to a method that counts the amounts of different values and prints then out.

Solution

```
function amounts_of_diff_vals(vals)
{
    var difs = 0;
    var i, j;
    var sample = [0,0,0,0,0];
    for (i = 0; i < 10; i++)
      switch (vals[i])
      {
           case 1: sample[0]++; break;
           case 2: sample[1]++; break;
           case 3: sample[2]++; break;
           case 4: sample[3]++; break;
```

```
            case 5: sample[4]++; break;

       }

     for (i = 0; i < 5; i++)
       document.write(" " + i+1 +  ". " + sample[i]);

}

Main:
     var array;
     var i;
     for (i = 0; i < 10; i++)
     {
      array[i]  = Math.floor(Math.random() * 5) + 1;
     }

call:
     amounts_of_diff_vals(array);
```

Task 54

Function converts the text to morse code characters.

Solution

```
function morse_this(var message)
{
     var p = message.lenght;

     var i;
     for (i = 0; i < p; i++)
     {
      switch(maggage.charAt(i))
      {
            case 'O': document.write("--- "); break;
            case 'S': document.write("... "); break;
            case ' ': document.write("  "); break;
     }
}

}
```

Task 55

Function returns the range value of an array that has 5 whole numbers and that is passed to the function. Range means: max – min.

Solution

```
function range(vals, n)
{
     var max = vals[0];
     var min = vals[0];

     var i;

     for (i = 0; i < n; i++)
     {
      if (vals[i] < min)
         min = vals[i];
      if (vals[i] > max)
```

```
            max = vals[i];
        }

        return (max - min);
}
```

SET 6: Strings

Strings handled

Task 56

Function checks if the post code includes exactly 5 numbers

Solution

```
function check_post_code(text)
{
     var i;
     var res = 1;
     var n = text.length;
     if (n != 5)
        { res = 0; return res;}

else
     {
      for (i = 0; i < n; i++)
        if (text.charAt(i) < '0'  && text.charAt(i) > '9')
        {
            res = 0;
            break;
        }
     }

     return res;
}
```

Task 57

Program checks if an email-address contains '@' character.

Solution

```
var email = "ducks@ducks.com";

var isThere = -1;
```

```
var p = email.length;

var i;
for (i = 0; i < p; i++)
     {
      if (email.charAt(i)  == '@')
      {
            isThere = i;
            break;
      }
     }

     if ( isThere == -1)
        document.write("EI oo  ");
     else
       document.write("O.  ");
```

Task 58

Program prints out the country code (top level domain name) of an url.

Solution

```
     var url = "www.vossilos.com";

     var lastdot;

     var p = url.length;

     var i;
     for (i = 0; i < p; i++)
     {
      if (url.charAt(i)  == '.')
      {
            lastdot = i;
      }
     }

     for (i = lastdot; i < p; i++)
     {
      document.write(url[i]);

     }
```

Task 59

Program prints out the protocol of an url.

Solution

```
var url = "https://www.vossilos.com";

var colonplace;


var p = url.length;

var i;
for (i = 0; i < p; i++)
{
 if (url.charAt(i)  == ':')
 {
       colonplace = i;
       break;
 }
}

for (i = 0; i < colonplace; i++)
{
 document.write(url[i]);

}
```

Task 60

Program tells if a string is a palindrome.

Solution

```
var word = "rotator";

var size = word.length;

var newword = "";

var s = 0;
var j;
for (j = size - 1; j >= 0; j--)
{
 newword += "" + (word.charAt(j));
 //document.write("orig " +  word.charAt(j));
 s++;
}
```

```
document.write("<br>");
document.write("orig " + word);
    document.write("<br>");
document.write("new " + newword);

document.write("<br>");

if (word.localeCompare(newword) == 0)
document.write("Is a pal...  ");
else
document.write("Is not a pal...  ");
```

Task 61

String variable contains 5 measures separated by commas. Your program calculates the average of those values. (E.g. "2, 3.5, 1, 5.8, 10") is given.)

Solution

```
var row = "2, 3.5, 1, 5.8, 10";
 var comma_places = [0,0,0,0];
 var size = row.length;

 var i;
 var j = 0;
 for (i = 0; i < size; i++)
 {
        if (row.charAt(i) == ',')
        {
         comma_places[j] = i;
          j++;
    }
}


 for (j = 0; j < 4; j++)
  document.write("  " + comma_places[j]);
  document.write("<br>");document.write("<br>");


 var v1 = row.substring(0, comma_places[0]);
 document.write("part 1 is " + v1);
 document.write("<br>");
 var v2 = row.substring(comma_places[0]+1, comma_places[1]);
 document.write(" part 2 is " + v2);
```

```
document.write("<br>");
var v3 = row.substring(comma_places[1]+1, comma_places[2]);
document.write(" part 3 is " + v3);
document.write("<br>");
 var v4 = row.substring(comma_places[2]+1, comma_places[3]);
document.write(" part 4 is " + v4);
document.write("<br>");
 var v5 = row.substring(comma_places[3]+1, comma_places[4]);
document.write(" part 4 is " + v5);



document.write("<br>");
var a = parseInt(v1);
var b = parseInt(v2);
var c = parseInt(v3);
var d = parseInt(v4);
var e = parseInt(v5);

var avg = (a + b + c + d + e)/5;
```

Task 62

Read a NMEA sentence and prvar latitude and longitude.

Info here

NMEA-0183 message: GGA

Related Topics

- NMEA-0183 messages: Overview

Time, position, and fix related data

An example of the GBS message string is:

```
$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-25.669,M,2.0
0031*4F
```

NOTE – The data string exceeds the NMEA standard length.

GGA message fields

Field	Meaning
0	Message ID $GPGGA
1	UTC of position fix
2	Latitude
3	Direction of latitude: N: North S: South
4	Longitude

Solution

```
var nmea_sentence =
"$GPGGA,172814.0,3723.46587704,N,12202.26957864,W,2,6,1.2,18.893,M,-25.669,M,2.0,
0031*4F";

 var povar1, povar2, povar3, povar4

 var p = 0;
 var size = nmea_sentence.length;
 var i;
 for (i = 0; i < size; i++)
 {
      if (nmea_sentence[i] == ',')
      {
      p++;
  if (p == 2)
        povar1 = i;

  if (p == 3)
        povar2  = i;

  if (p == 4)
        povar3 = i;

  if (p == 5)
         povar4 = i;
```

```
}
 }

 document.write("<br>");

 document.write("Latitude is  ");
 for (i = povar1 + 1; i < povar2; i++)
  document.write("" + nmea_sentence[i] );

  document.write("<br>");
 document.write(" Longitude is  ");
 for (i = povar3+1; i < povar4; i++)
  document.write("" + nmea_sentence[i] );
```

Task 63

Check that given country code has exactly 1..3 numbers.
Country codes are listed here...
https://www.iban.com/country-codes

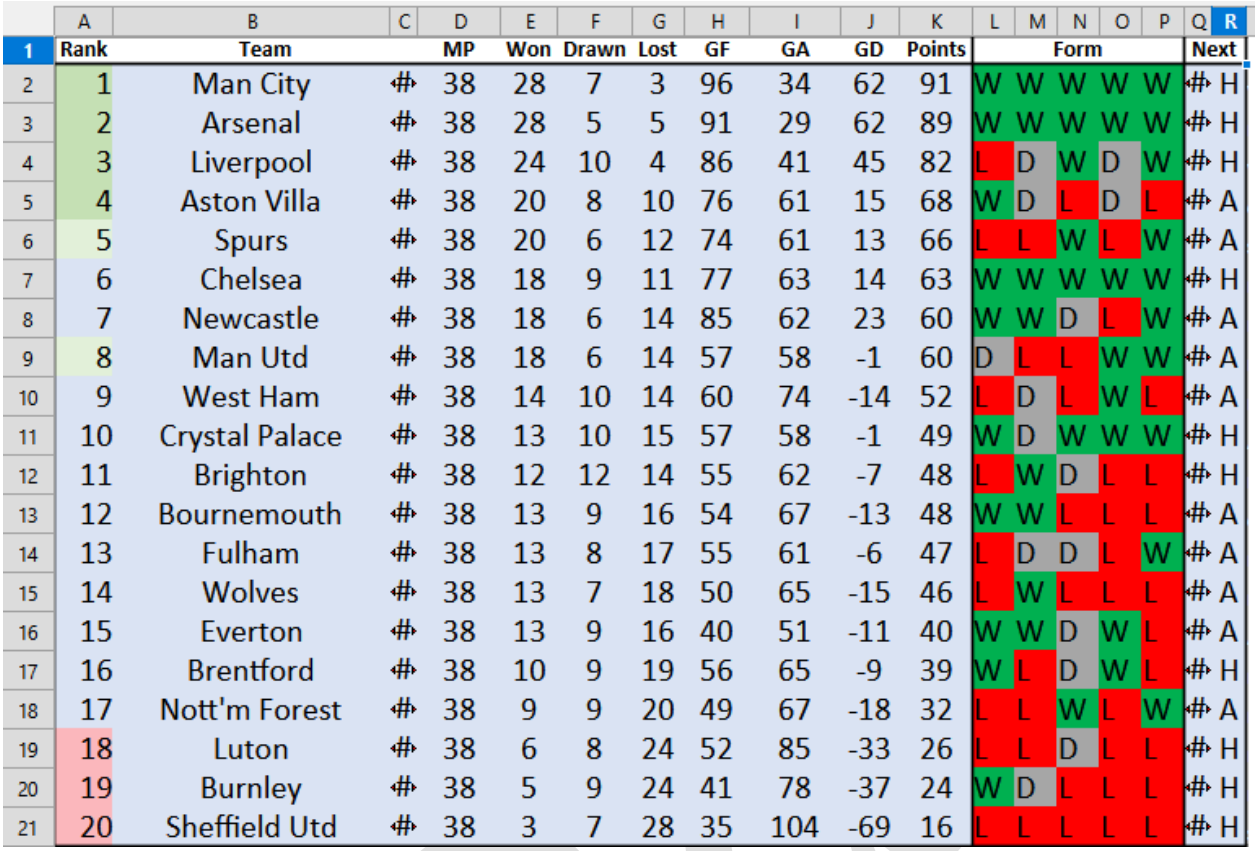
Solution

```
var ok = 0;

 var code = "878";
 var codesize = code.length;

 if (codesize == 3)
 {
   if (code[0] >= '0' && code[0] <= '9'  &&
    code[1] >= '0' && code[1] <= '9' &&
    code[2] >= '0' && code[2] <= '9')
    ok = 1;
  else
    ok = 0;
 }

 document.write(ok);
```

Task 64

Information of english league has been used here.
Url is
https://www.excel4soccer.com/2024/07/27/english-premier-league-table-in-excel/

First was data taken to excel (in this case was LibreOffice calc used).



Rank	Team	MP	Won	Drawn	Lost	GF	GA	GD	Points	Form	Next
1	Man City	38	28	7	3	96	34	62	91	W W W W W	H
2	Arsenal	38	28	5	5	91	29	62	89	W W W W W	H
3	Liverpool	38	24	10	4	86	41	45	82	L D W D W	H
4	Aston Villa	38	20	8	10	76	61	15	68	W D L D L	A
5	Spurs	38	20	6	12	74	61	13	66	L L W L W	A
6	Chelsea	38	18	9	11	77	63	14	63	W W W W W	H
7	Newcastle	38	18	6	14	85	62	23	60	W W D L W	A
8	Man Utd	38	18	6	14	57	58	-1	60	D L L W W	A
9	West Ham	38	14	10	14	60	74	-14	52	L D L W L	A
10	Crystal Palace	38	13	10	15	57	58	-1	49	W D W W W	H
11	Brighton	38	12	12	14	55	62	-7	48	L W D L L	H
12	Bournemouth	38	13	9	16	54	67	-13	48	W W L L L	A
13	Fulham	38	13	8	17	55	61	-6	47	L D D L W	A
14	Wolves	38	13	7	18	50	65	-15	46	L W L L L	A
15	Everton	38	13	9	16	40	51	-11	40	W W D W L	A
16	Brentford	38	10	9	19	56	65	-9	39	W L D W L	H
17	Nott'm Forest	38	9	9	20	49	67	-18	32	L L W L W	A
18	Luton	38	6	8	24	52	85	-33	26	L L D L L	H
19	Burnley	38	5	9	24	41	78	-37	24	W D L L L	H
20	Sheffield Utd	38	3	7	28	35	104	-69	16	L L L L L	H

Then table was parsed:

	A	B	C	D	E	F
1	Team	MP	Won	Drawn	Lost	Points
2	Man City	38	28	7	3	91
3	Arsenal	38	28	5	5	89
4	Liverpool	38	24	10	4	82
5	Aston Villa	38	20	8	10	68
6	Spurs	38	20	6	12	66
7	Chelsea	38	18	9	11	63
8	Newcastle	38	18	6	14	60
9	Man Utd	38	18	6	14	60
10	West Ham	38	14	10	14	52
11	Crystal Palace	38	13	10	15	49
12	Brighton	38	12	12	14	48
13	Bournemouth	38	13	9	16	48
14	Fulham	38	13	8	17	47
15	Wolves	38	13	7	18	46
16	Everton	38	13	9	16	40
17	Brentford	38	10	9	19	39
18	Nott'm Forest	38	9	9	20	32
19	Luton	38	6	8	24	26
20	Burnley	38	5	9	24	24
21	Sheffield Utd	38	3	7	28	16
22						

Read the file and print it.

Then table was taken to LibreOffice writer and there is was converted to a format that can be used in JS-program. E.g. Find and Replace was used....

```
var  leagueTable2024 =
[["Man City","38","28","7","3","91"],
["Arsenal","38","28","5","5","89"],
["Liverpool","38","24","10","4","82"],
["Aston Villa","38","20","8","10","68"],
["Spurs","38","20","6","12","66"],
["Chelsea","38","18","9","11","63"],
["Newcastle","38","18","6","14","60"],
["Man Utd","38","18","6","14","60"],
["West Ham","38","14","10","14","52v
["Crystal Palace","38","13","10","15","49v
["Brighton","38","12","12","14","48"],
["Bournemouth","38","13","9","16","48"],
["Fulham","38","13","8","17","47"],
["Wolves","38","13","7","18","46"],
["Everton","38","13","9","16","40"],
["Brentford","38","10","9","19","39"],
["Nott'm Forest","38","9","9","20","32"],
["Luton","38","6","8","24","26"],
["Burnley","38","5","9","24","24"],
["Sheffield Utd","38","3","7","28","16"]],
```

Now we cam handle data: print, search and so on using JS code.

Note: we could also read a textile directly to JS array by using node.js, json or other methods.

Solution

```
var  leagueTable2024 =
    [["Man City","38","28","7","3","91"],
    ["Arsenal","38","28","5","5","89"],
    ["Liverpool","38","24","10","4","82"],
    ["Aston Villa","38","20","8","10","68"],
    ["Spurs","38","20","6","12","66"],
    ["Chelsea","38","18","9","11","63"],
    ["Newcastle","38","18","6","14","60"],
    ["Man Utd","38","18","6","14","60"],
    ["West Ham","38","14","10","14","52"],
    ["Crystal Palace","38","13","10","15","49"],
    ["Brighton","38","12","12","14","48"],
    ["Bournemouth","38","13","9","16","48"],
    ["Fulham","38","13","8","17","47"],
    ["Wolves","38","13","7","18","46"],
    ["Everton","38","13","9","16","40"],
    ["Brentford","38","10","9","19","39"],
    ["Nott'm Forest","38","9","9","20","32"],
    ["Luton","38","6","8","24","26"],
    ["Burnley","38","5","9","24","24"],
    ["Sheffield Utd","38","3","7","28","16"]];


    var i, j;

    for (i = 0; i < 20; i++)
    {
       for (j = 0; j < 6; j++)
         document.write(" " +  leagueTable2024[i][j]);

          document.write("<br>");

    }
```

Try to code and then use your own data.

Task 65

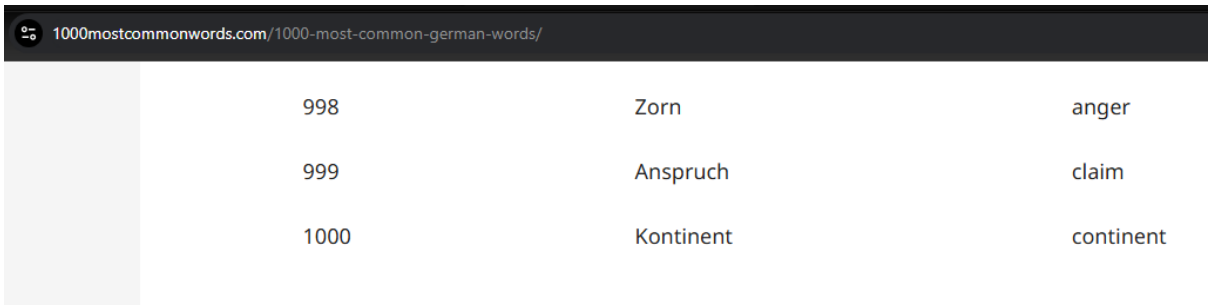
In Finland, the Personal Identity Code (Finnish: henkilötunnus (HETU), Swedish: personbeteckning) also known as Personal Identification Number consists of eleven characters of the form DDMMYYCZZZQ, where DDMMYY is the date of birth, C the century sign, ZZZ the individual number and Q the control character (checksum). Check given code.

Solution

```
var sotu = "040363-011X";

var nrs = "";
for (var i = 0;  i < sotu.length-1; i++)
{
 if (sotu.charAt(i) != '-')
   nrs += sotu.charAt(i);
 }

var as_value = parseInt(nrs);

var div = as_value % 31;

var right_chars = "0123456789ABCDEFHJKLMNPRSTUVWXY";

document.write("correct character: " + right_chars[div]);

if (right_chars[div] == sotu[11])
    document.write(" YEAH");
else
  document.write(" NONO");
```

Task 66

Create a Finnish German dictionary. Take words from some net place and add them to an array. OR use other languages...
Here is an example:



Data was taken to text editor and with replace activity data is parsed to this format: (some rows here)

```
[["wie","as"],
["ich","I"],
["seine","his"],
["dass","that"],
["er","he"],
["war","was"],
["für","for"],
["auf","on"],
["sind","are"],
["mit","with"],
["sie","they"],
["sein","be"],
["bei","at"],
["ein","one"],
["haben","have"],
["dies","this"],
["aus","from"],
["durch","by"],
["heiß","hot"],
```

Solution

```
var words =
[["wie","as"],
```

```
["ich","I"],
["seine","his"],
["dass","that"],
["er","he"],
["war","was"],
["für","for"],
["auf","on"],
["sind","are"],
["mit","with"],
["sie","they"],
["sein","be"],
["bei","at"],
["ein","one"],
["haben","have"],
["dies","this"],
["aus","from"],
["durch","by"],
["heiß","hot"],
["Wort","word"],
["aber","but"],
["was","what"],
["einige","some"],
["ist","is"],
["es","it"],
["Sie","you"]];

// note: you can copy the whole list from the end of this ebook!!

for (var i = 0; i < 20; i++)
{
  for (var j = 0; j < 2; j++)
    document.write(" " + words[i][j]);

   document.write("<br>");
  }

document.write("<br>");

  var german = "einige";

  for (var i = 0; i < 30; i++)
     if (words[i][0] == german)
          {
            document.write(words[i][1]);
           break;
         }
```

SET 8: Libraries (Objects)

Task 67
Program calculates the hypotenuse of an triangle when other sides are given.

Solution
```
var a, b, c;
a = 3;
b = 4;
c = Math.sqrt(a*a + b*b);

document.write("c = "+ c);
```

Task 68
Program rounds a double value to a value that has 2 numbers in its fractional part.

Solution
```
var x = 22.4567;
var y = Math.round(100*x+0.5)/100;
document.write("y = "+  y);
```

Task 69
Program tells how much time does it take to sort an array of 100000 elements.
Compare sorting times to time got from c:s own sort() function.

Solution
```
var size = 15000;

  var vals = [];

  var i;
  for (i = 0; i < size; i++)
  {
    vals[i] = Math.floor(Math.random() * 1000);
  }



  // selection sort
  const start = Date.now();
```

```
  var m, n, temp;
  for (m = 0; m < size; m++)
    for (n = m + 1; n < size; n++)
    {
     if (vals[n] < vals[m])
     {   // swap
           temp = vals[n];
           vals[n] = vals[m];
           vals[m] = temp;
       }
     }

  const end = Date.now();
  var elapsed = end - start;
  document.write("Execution time: " + elapsed + " ms");

// Js-SORT example
```

```
 for (i = 0; i < size; i++)
 {
      vals[i] = Math.floor(Math.random() * 1000);
 }

  var start1 = Date.now();
  vals.sort();
  var end1 = Date.now();
  var elapsed = end1 - start1;
  document.write("Execution time: " + elapsed + " ms");
```

Task 70

Calculate the square root of some value using numeric method and compare the result to the value got with sqrt() function.

Solution

```
     var a = 5;
     var c = 0.3;
     while (1)
     {
      if ((c*c - a) > -0.1 && (c*c - a) < 0.1 )
           break;
           c = c * 1.1;
     }
    document.write("c = " +  c);
```

Task 71

Calculate approximations of Nepers's value, pi and cos(0.9) and compare them t values of got from math.h functions.

Solution

```
var fact(var n)
{
     var kert = 1;
     var i;
     for (i = 1; i <= n; i++)
     {
      kert = kert * i;
     }

     return kert;
}

var main()
{
     var j;
     var e = 1;
     for (j = 1; j < 10; j++)
     {
     e  = e + 1.0/fact(j);
     }

     document.write("%f  ", e);

     document.write("%f  ", M_E);
```

Task 72

Program throws dice 100 times and tells amounts of different values (1, 2, 3, 4, 5, and 6).

Solution

```
   srand(time(NULL));


   var n1 = 0;  var n2 = 0;  var n3 = 0;
   var n4 = 0;  var n5 = 0;  var n6 = 0;

   var i;
   for (i = 0; i < 10000; i++)
```

```
{
     var noppis = rand() % 6 + 1;

     switch (noppis)
     {
          case 1: n1++; break;
          case 2: n2++; break;
          case 3: n3++; break;
          case 4: n4++; break;
          case 5: n5++; break;
          case 6: n6++; break;
     }
}

 document.write("1: "+ n1);
document.write("2: "+ n2);
document.write("3: "+ n3);
document.write("4: "+ n4);
 document.write("5: "+ n5);
 document.write("6: "+ n6);
```

Task 73

Now we take GUI with! HTML contains form components (controls) that can be used to create the gui.

Here is an example: we have a dictionary and user can type the English word and the correspondent Finnish

```
<script language="JavaScript">
var words =
[
"Hi!"," Terve",
"Good morning!"," Hyvää huomenta!",
"Good evening!"," Hyvää iltaa!",
"Welcome! (to greet someone)"," Tervetuloa!",
"How are you?"," Mites menee?",
"I'm fine, thanks!"," Kiitos hyvin!",
"And you?"," Ja sinulla?",
"Good"," Hyvä ",
"Thank you (very much)!"," Kiitos paljon! ",
"You're welcome!"," Ole hyvä ",
"Hey! Friend!"," Hei! kaveri! ",
"I missed you so much!"," Kaipasin sinua paljon!",
"What's new?","  Mitä uutta? ",
"Nothing much"," Ei mitään oikastaan ",
"Good night!"," Hyvää yötä! ",
"See you later!"," Nähdään myöhemmin! ",
```

```
"Good bye!"," Näkemiin!"
];

function doIt()
{
 var eng = p1.english.value;
 var res = "not found";
for (var k = 0; k < words.length; k++)
{
   if (words[k] == eng)
    {
     res = words[k+1];
     break;
  }
  }
p1.result.value = res;
}
</script>
</HEAD>


<BODY>
<H1>Phrases</H1>

<FORM NAME = "p1">
English word(s): <BR>
<INPUT TYPE = "TEXT" NAME = "english" SIZE=50><BR>
<INPUT TYPE = "TEXT" NAME = "result" SIZE=50><BR>
<INPUT TYPE = "BUTTON" VALUE="Translate" onClick="doIt()">
<INPUT TYPE = "RESET" VALUE="Clear">


</FORM>

</body> word is to be searched...
```

Test run

Task 74

Program tells how many big letters (capital letters) does a string contain.

Text is here:
The EEA includes EU countries and also Iceland, Liechtenstein and Norway.
It allows them to be part of the EU's single market.
Switzerland is not an EU or EEA member but is part of the single market.
This means Swiss nationals have the same rights to live and work in the UK as other EEA nationals.

Solution

```
var text = "The EEA includes EU countries and also Iceland,
Liechtenstein and Norway. It allows them to be part of the EU single
market.Switzerland is not an EU or EEA member but is part of the
single market.";

 document.write("<br>");
var bigs = 0;


for (var k = 0; k < 100; k++)
{
if (text.charAt(k) >= 'A' && text.charAt(k) <='Z')
      bigs++;
    //document.write("---" + parseInt(text.charAt(k)));
}


 document.write("<br>");
 document.write(" ppp " + bigs);
```

Task 75

A stone is dropped down from the top of Pisa tower.
What is the final speed of the stone and how much time does the fall take?

Solution

```
    //  v = s/t       a = v/t     a = g
    //  g = v/t    | *t => gt = v  |:g  => t = v/g  => t = s/t */g
| *t  => t^2 = s/g
```

```
// => gt^2 = s =>  t^2 = s/g
//  t = sqrt(s/g)
//  g = 9.81 m/sek^2  => t = sqrt(57/9.81)  => 2,3 sek
//  v = 57/2,3  => 24,5 m/sek  => 88 km/h

        var s = 57; // m
var g = 9.81;
var t = sqrt(s/g);

document.write("%f  ", t);

var v = s/t;

document.write("%f  ", v);

v = (s/1000)/(t/3600);

document.write("%f  ", v);
```

Task 76

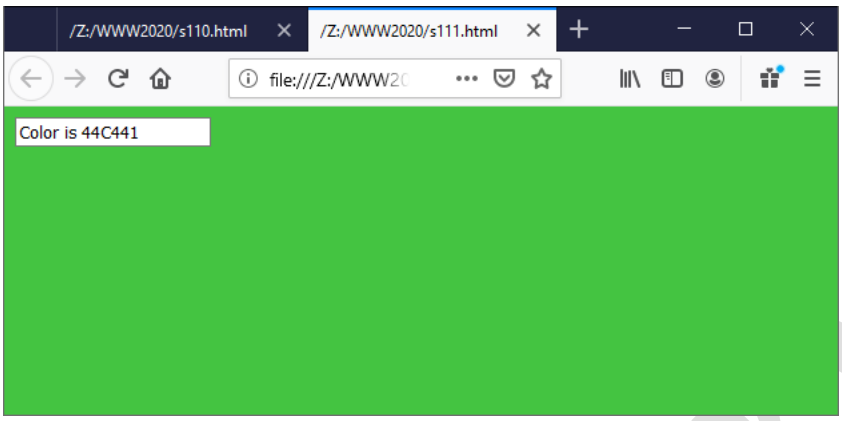
Let's take a look at DOM and BOM in next tasks.
Document Object Model (DOM) an interface that allows to manipulate document specific objects.

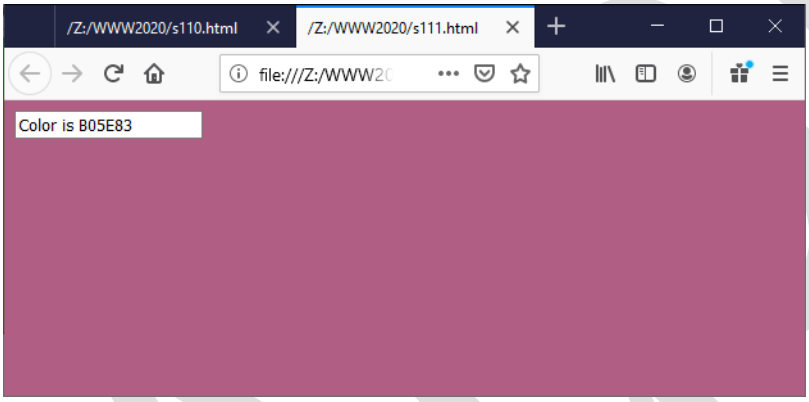
Browser Object Model (BOM) contains browser-specific objects.

Create a program that manipulates Document object: change the background color after some specific interval.

```
<SCRIPT LANGUAGE="JavaScript">
function colours()
{
v1 = Math.round(Math.random() * 255);
v2 = Math.round(Math.random() * 255);
v3 = Math.round(Math.random() * 255);
heksat = "0123456789ABCDEF";
h1 = heksat.charAt(v1 / 16);
h2 = heksat.charAt(v1 % 16);
h3 = heksat.charAt(v2 / 16);
h4 = heksat.charAt(v2 % 16);
h5 = heksat.charAt(v3 / 16);
h6 = heksat.charAt(v3 % 16);
ashex = "" + h1 + h2 + h3 + h4 + h5 + h6;
document.test.col.value = "Color is " + ashex;
document.bgColor = ashex;
setTimeout('colours()',1000);
}
</SCRIPT>
</HEAD>
<BODY onLoad="window.setTimeout('colours()',1000);">
<form name="test">
<input type = "text" name="col">
</form>
```

Test run


/Z:/WWW2020/s110.html
/Z:/WWW2020/s111.html
file:///Z:/WWW2
Color is 44C441


/Z:/WWW2020/s110.html
/Z:/WWW2020/s111.html
file:///Z:/WWW2
Color is B05E83

Task 77

Create a program that shows time.

```
<SCRIPT LANGUAGE = "JavaScript">
function showTime()
{
 var timeNow = new Date();
 var hours = timeNow.getHours();
 var minutes = timeNow.getMinutes();
 var seconds= timeNow.getSeconds();

 document.getElementById("T").innerHTML = "" + hours +
           ":" + minutes + ":" + seconds;

  setTimeout('showTime()',1000);
 }
 </SCRIPT>
 </HEAD>
 <BODY onLoad="showTime()">
 <p id="T">Clock is </p>
```

Task 78

Create picture gallery using JavaScript: new image is shown after 2 seconds interval.

```
<head>
      <script language="JavaScript">
      var c=0;
      function openPic()
      {
         c++;
         if (c == 1)
         document.images[0].src = "gil1.jpg";
         if (c == 2)
         {
            document.images[0].src = "gil2.jpg";
         }
         if (c == 3)
         {
            document.images[0].src = "gil3.jpg";
         }
         if (c == 4)
         {
            document.images[0].src = "gil4.jpgg";
         }
         if (c == 5)
         {
            document.images[0].src = "gil5.jpg";
            c = 0;
         }
      }
      function timeCount()
      {
         openPic();
         setTimeout('timeCount()',2000);
      }
   </script>
</head>
<body onLoad="setTimeout ('timeCount()',2000)">
   <H1>Image Gallery: lovely girls</H1>
   <p>Enjoy!</p>
   <br>
   <img id="images" src="gil0.jpg"/>
</body>
```

Test run

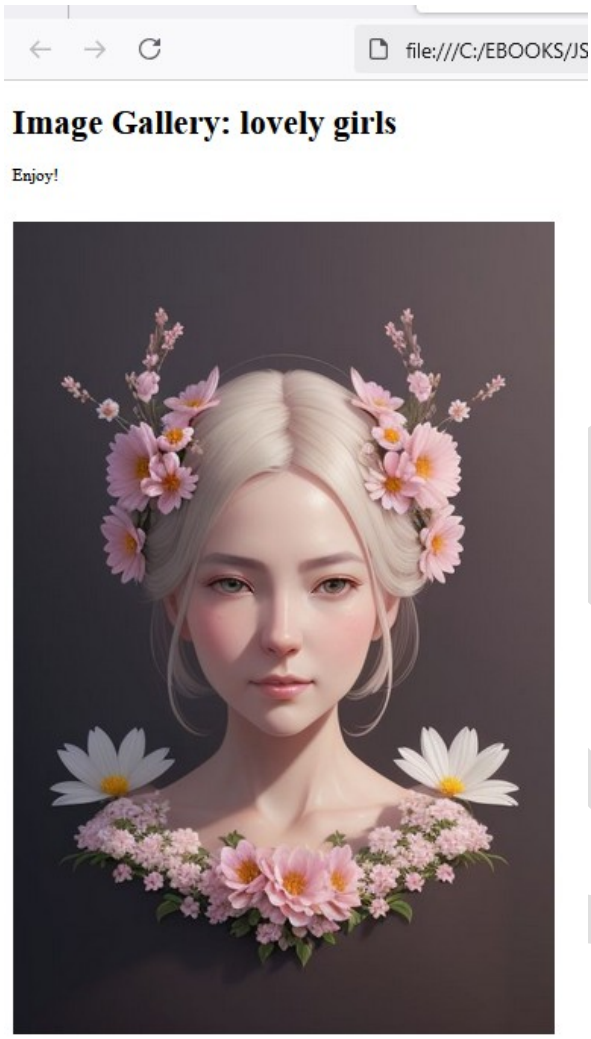
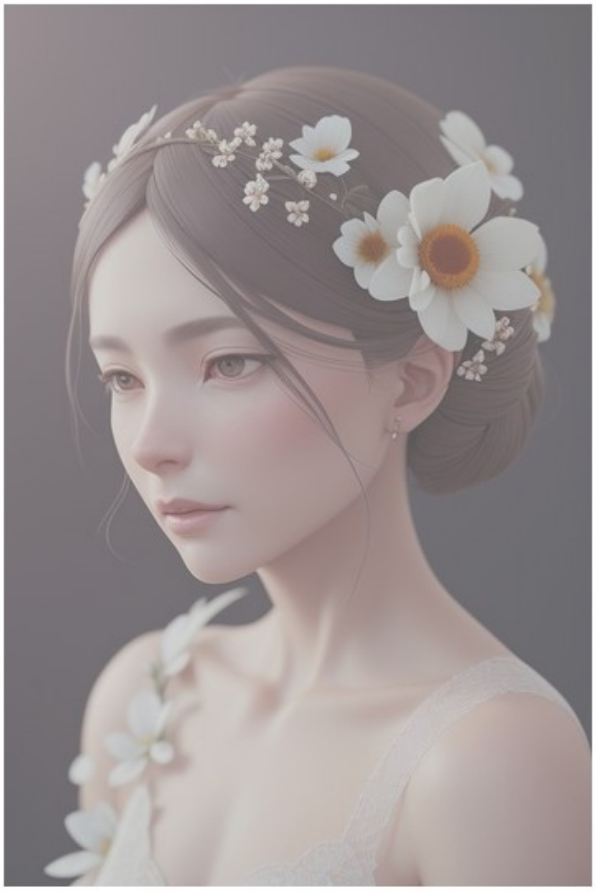

file:///C:/EBOOKS/JS
Image Gallery: lovely girls
Enjoy!

Image Gallery: lovely girls

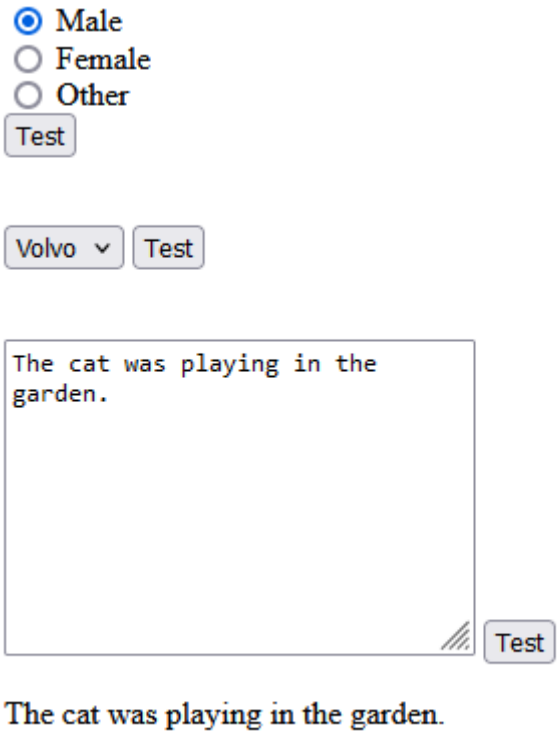
Enjoy!



Task 79

Create a form that contains radiobutton, combobox and textarea.

Here the form example.



When Test-button is clicked, chosen item or written contents is printed below.

Here are functions

```
function test_1()
{
  var ab = "";
  ab += a.gender.value;
  document.getElementById("results").innerHTML = ab;
```

```
}

function test_2()
{
  var ab = "";
  ab += b.cars.value;
  document.getElementById("results").innerHTML = ab;
}

function test_3()
{
  var ab = "";
  ab += c.message.value;
  document.getElementById("results").innerHTML = ab;
}
```

Here are forms

```
<form name = "a">
 <input type="radio" name="gender" value="male" checked> Male<br>
 <input type="radio" name="gender" value="female"> Female<br>
 <input type="radio" name="gender" value="other"> Other  <br>
 <input type = "button" name ="button" value="Test" onClick="test_1()"><br>
</form>

<br>
<form name = "b">
<select name="cars">
 <option value="volvo">Volvo</option>
  <option value="saab">Saab</option>
 <option value="fiat">Fiat</option>
  <option value="audi">Audi</option>
</select>
```

```
 <input type = "button" name ="button" value="Test" onClick="test_2()"><br>
</form>



<br>
<form name = "c">
<textarea name="message" rows="10" cols="30">
The cat was playing in the garden.
</textarea>
 <input type = "button" name ="button" value="Test" onClick="test_3()"><br>
</form>


And here is to output coming:
<div id="results">results here </div>
```

SET 9: Bitwise operators

Task 80

Create a program that uses all bit operators that are shown in the table below.

So, create 2 integer variables. Assign values and test AND, OR and XOR.
Then try shift operators with one variable.
Print also results.

Here are bitwise operators

Operator	Meaning
&	AND
|	OR
<<	Left shift
>>	Right shift
~	One's complement
^	XOR

Solution

```
var a = 199; // 1100 0111
var b = 222; // 1101 1110
var c;

// AND  &
/*
11000111
11011110
11000110    => 198
*/
c = a & b;
document.write("a & b is "+ c);

// OR  |
/*
11000111
11011110
11011111   => 223
*/
c = a | b;
document.write("a | b is "+ c);

// XOR ^
/*
11000111
11011110
00011001   => 25
*/
c = a ^ b;
document.write("a ^ b is "+ c);

// shift the value of a 2 times to the left: a << 2
/*
11000111   << 2
1100011100  => 796
*/
 c = a << 2;
 document.write("a << 2 is "+ c);


// shift the value of variable a  once to the right a >> 1
 /*
 11000111   >> 1
 01100011   =>  99
 */
```

```
c = a >> 1;
document.write("a >> 1 is "+ c);
```

Task 81

Check the state of given bit in a bit queue

Tips: Right shift the original bit queue until the bit that has to be inverted is the first bit. Then take bitwise AND between 1 and shifted bit queue. You get the state of the wanted bit.

Solution

```
We have value 155 in a variable. As bits it is 10011011.
We want to know the 3. bit's state.  (LSB s now position 0).
So we shift 155 3 times to the right and get  00010011.
Then we take AND between that new bit queue and value 1 and we get
0000 0001
that tells that state is 1.

var a = 155;
var n = 3;
var state = (a >> n) & 1;
document.write("state is "+ state);
```

Task 82

Invert the given bit in a bit queue.

Tips: Create a bit mask that has bits 0 and where value 1 has the same position than the bit that is to b inverted. Then take Xor between the mask and the original bit queue. The result is a new bit queue where wanted bit is inverted.…

Solution

```
var a = 155;
var n = 4;
var mask = 1 << (n - 1);
a = a ^ mask;
document.write("a is now "+ a);
```

SET 13: Miscellaneous

Task 83

Create a Bank Desk SimulationApp.
It has a menu like this:
Check balance
Add money
Withdraw money
Exit

Solution

```
var balance = 1000;

function doIt(c)
{
 if (c == 1)
  {
   var money = 0;
   money = parseInt(p1.sum.value);
   balance += money;
  }
 else  if (c == 2)
   {
    var money = 0;
    money = parseInt(p1.sum.value);
    balance -= money;
  }

   p1.saldo.value = balance;
}
```

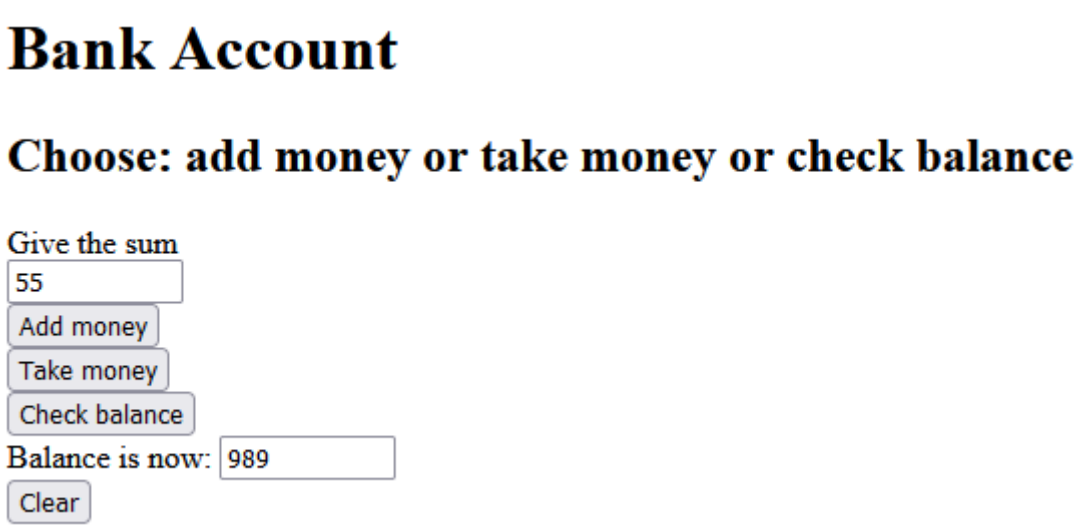
Form
<H1>Bank Account</H1>

<FORM NAME = "p1">
Choose:
<INPUT TYPE = "TEXT" NAME = "sum" SIZE=50>
<INPUT TYPE = "BUTTON" VALUE="Add money" onClick="doIt(1)">
<INPUT TYPE = "BUTTON" VALUE="Take money" onClick="doIt(2)">
<INPUT TYPE = "BUTTON" VALUE="Check balance" onClick="doIt(3)">
<INPUT TYPE = "TEXT" NAME = "saldo" SIZE=50>

<INPUT TYPE = "RESET" VALUE="Clear">

</FORM>

Test run



Task 84

An array contains coordinates of 2 dot coordinates. You program calculates the distance between thos povars.

Example values:
5.5 9
1.7 8

Solution

```
var povars = [[5.5, 9], [1.7, 8]];

var x1 = povars[0][0];
var y1 = povars[0][1];

var x2 = povars[1][0];
var y2 = povars[1][1];
```

```
 var dist = Math.sqrt((x1 - x2) * (x1 - x2) + (y1 - y2) * (y1 -
y2));

 document.write(dist);

}
```

Task 85

Generate Fibonacci value using a recursive function and non recursive function.

Solution

```
// 0, 1, 1, 2, 3, 5, 8, 13, 21, 34

var fibo1(var n)
{
    if (n == 0)
      return 0;
    else if (n == 1)
      return 1;
    else
      return fibo1(n-1) + fibo1(n-2);
}


var fibo2(var n)
{
    var fibs[10];
    fibs[0] = 0;
    fibs[1] = 1;
    var i;

    for (i = 2; i <= n; i++)
      fibs[i] = fibs[i-1] + fibs[i-2];

   return fibs[n];
}


  document.write(""+ fibo1(5));

  document.write(""+ fibo2(5));
```

Task 86

Create code that calculates standard deviation

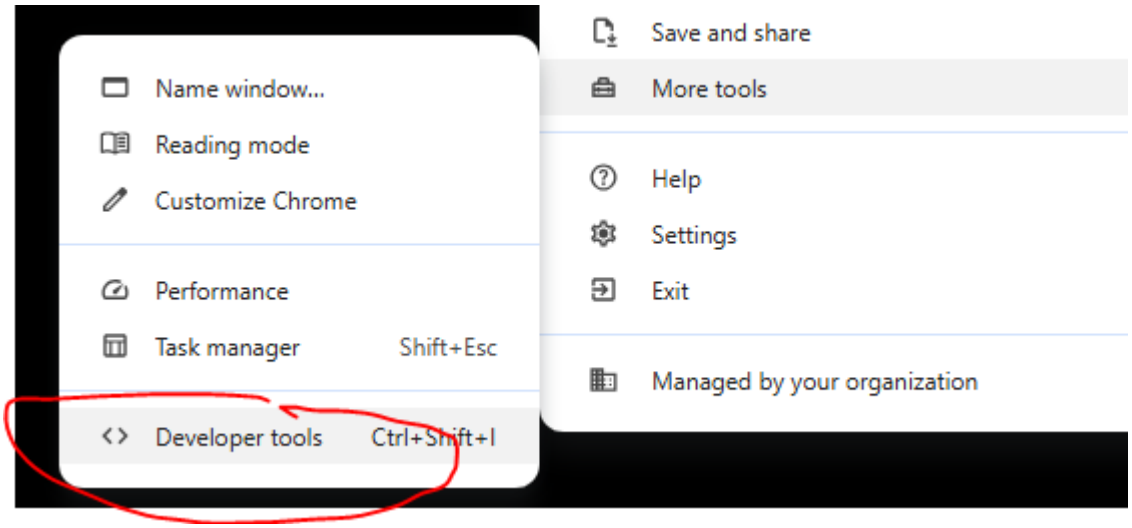
Solution

```
var vals = [];
var k;
for (k = 0; k < 100; k++)
  vals[k] = Math.floor(Math.random() * 1000);

var sum  = 0;
for (k = 0; k < 100; k++)
    sum = sum + vals[k];

var ka = sum/100.0;

var std = 0;
for (k = 0; k < 100; k++)
    std = std + (vals[k] - ka)*(vals[k] - ka);

std = std/100;
std = Math.sqrt(std);

document.write(" ", std);
```

Task 87

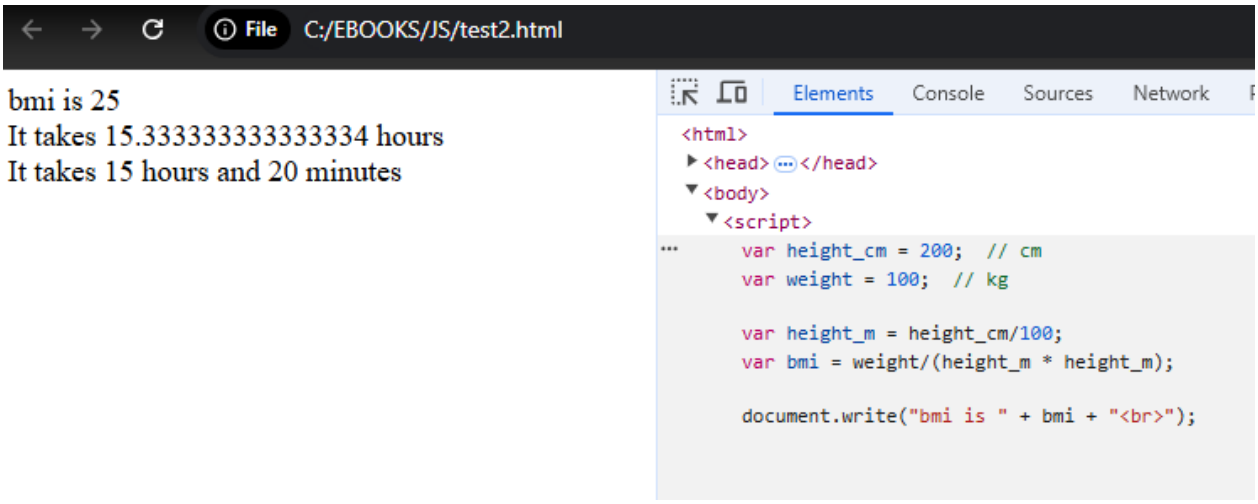
Take a look at some Javascript tools!

Tool nr 1 is Chrome Developer tools



You can use this tool to debug and test your code.

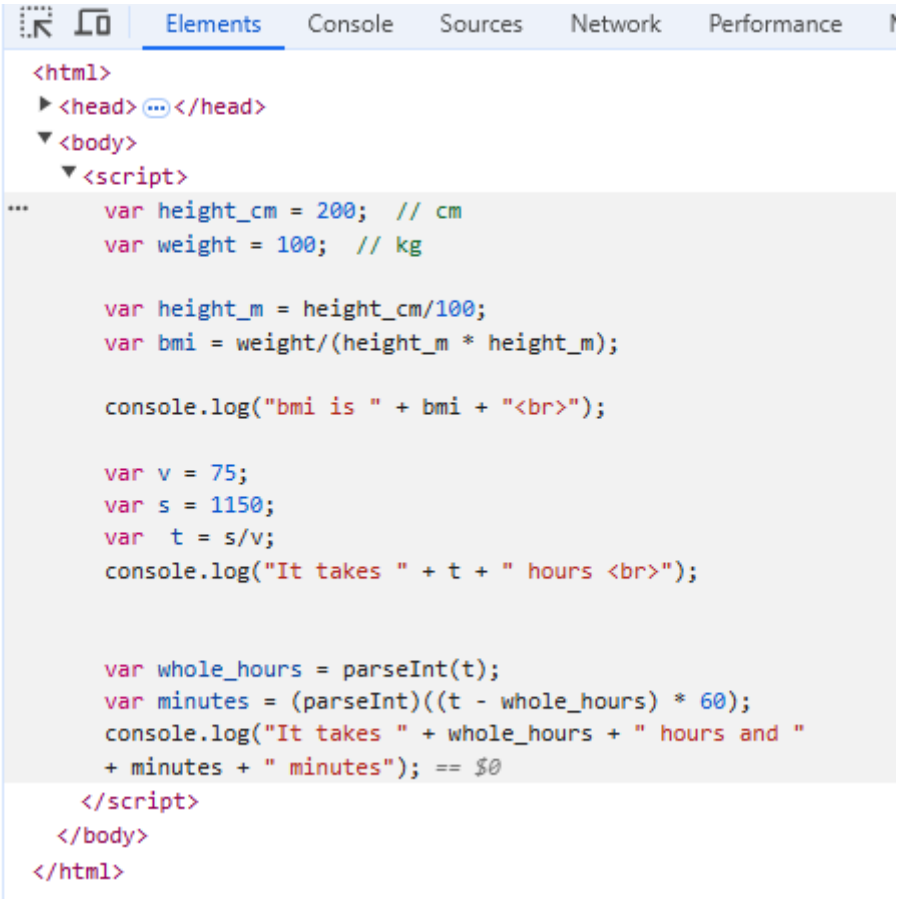
By using Console option, you can test outputs earlier and update your code when needed.



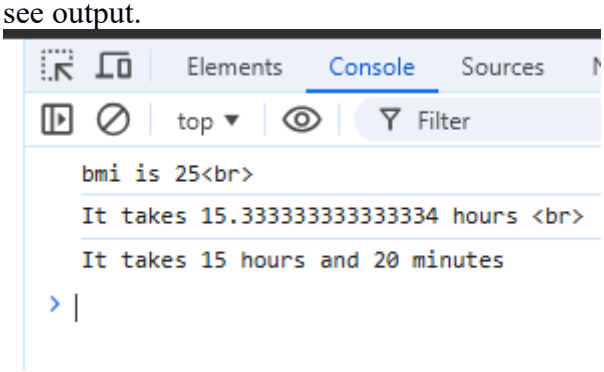
Next I put here the same task that is shown here above but use Console.log instead of document.write to see outputs.

```
var height_cm = 200;  // cm
var weight = 100;  // kg
var height_m = height_cm/100;
var bmi = weight/(height_m * height_m);

console.log("bmi is " + bmi + "<br>");

var v = 75;
var s = 1150;
var  t = s/v;
console.log("It takes " + t + " hours <br>");

var whole_hours = parseInt(t);
var minutes = (parseInt)((t - whole_hours) * 60);
console.log("It takes " + whole_hours + " hours and "
+ minutes + " minutes");
```

Now this code is seen in Chrome:



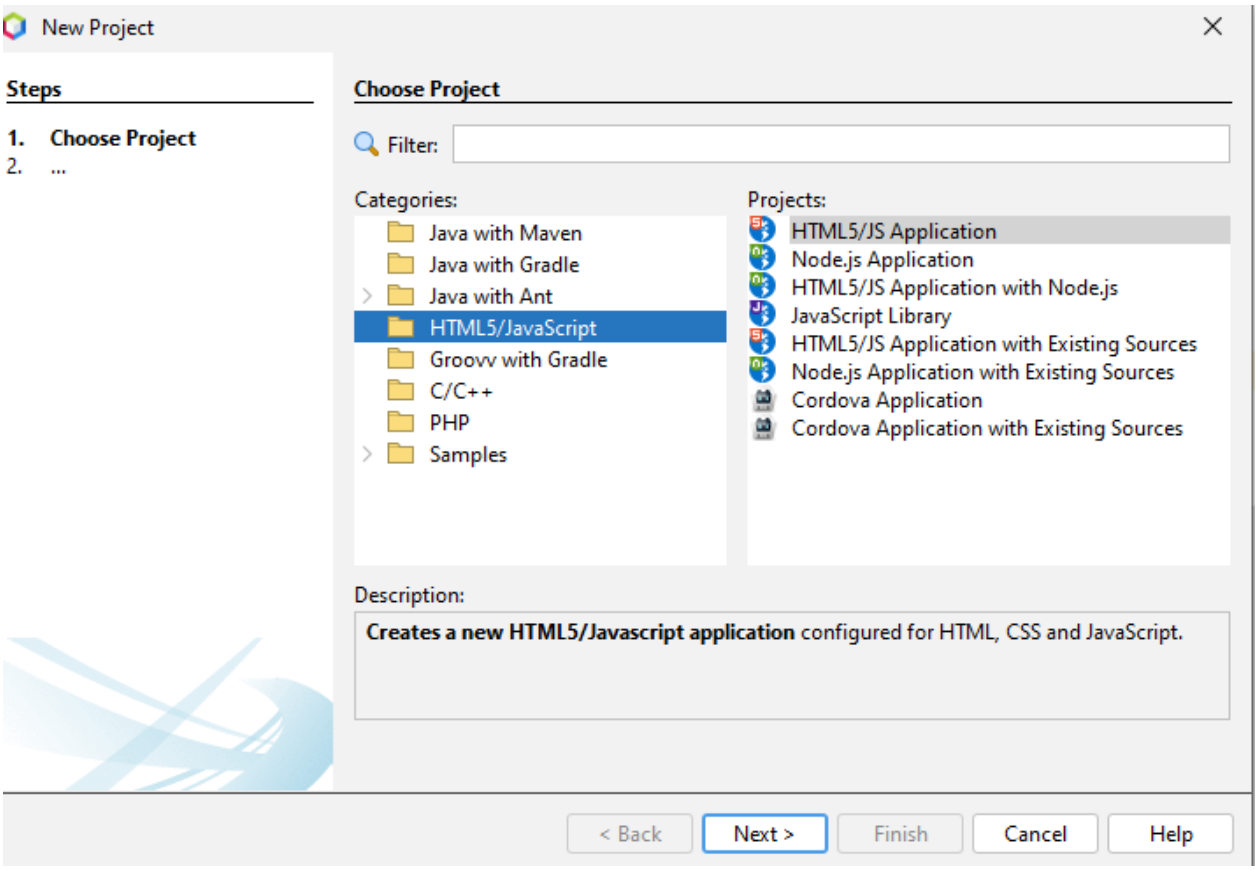
By choosing Console i can see output.



Good, free tool!!

It gives you even more information about the whole html.page if needed.

Tool nr 2 is NetBeans



I use this only for editing code but you can also run apps using Netbeans Connector...

Tool nr 3. Visual Studio Code

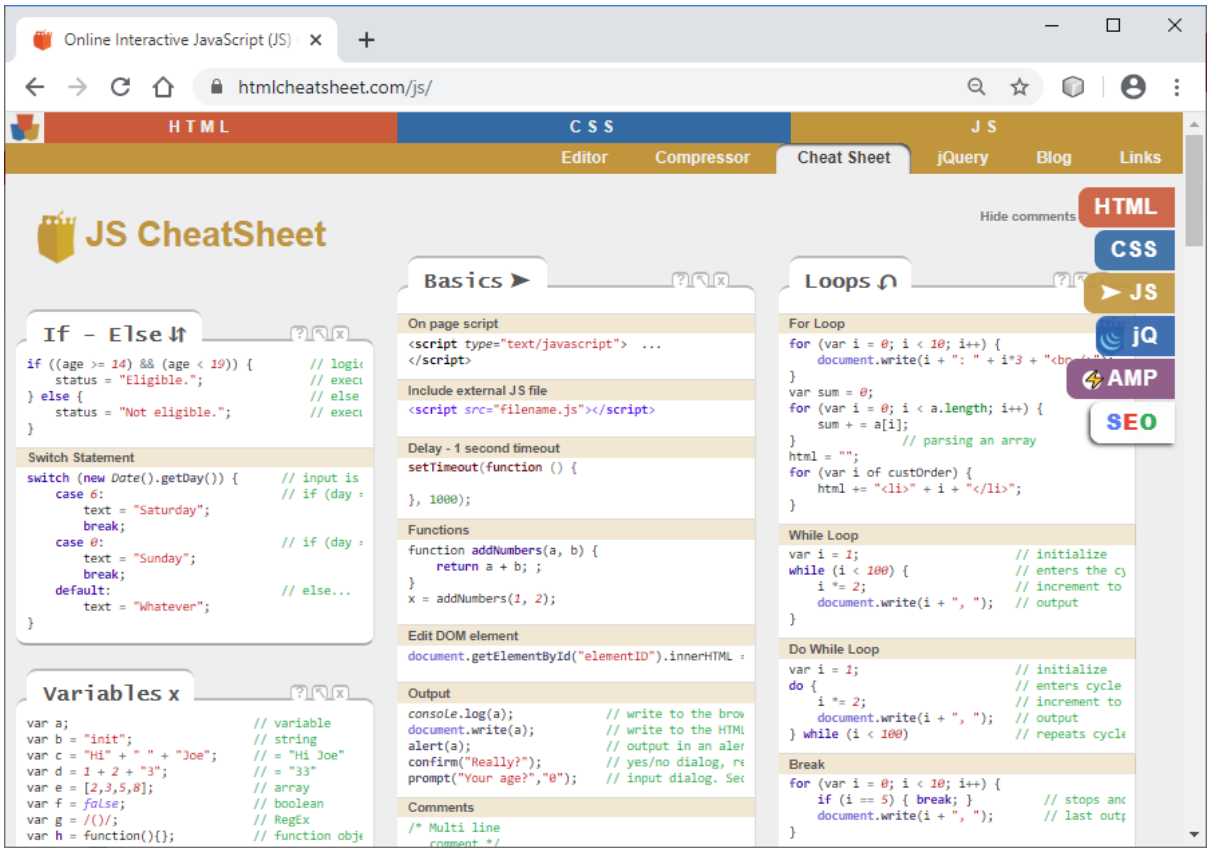
You can easily find many editor candidates by googling a bit :)

Task 88

Take a look at some good JavaScript websites. Here is a good cheatsheet.

Excellent summary of JavaScript syntax:

https://htmlcheatsheet.com/js/


Online Interactive JavaScript (JS)
htmlcheatsheet.com/js/
HTML
CSS
JS
Editor
Compressor
Cheat Sheet
jQuery
Blog
Links
JS CheatSheet
Hide comments
HTML
CSS
JS
jQ
AMP
SEO
If - Else
Switch Statement
Variables
Basics
On page script
Include external JS file
Delay - 1 second timeout
Functions
Edit DOM element
Output
Comments
Loops
For Loop
While Loop
Do While Loop
Break

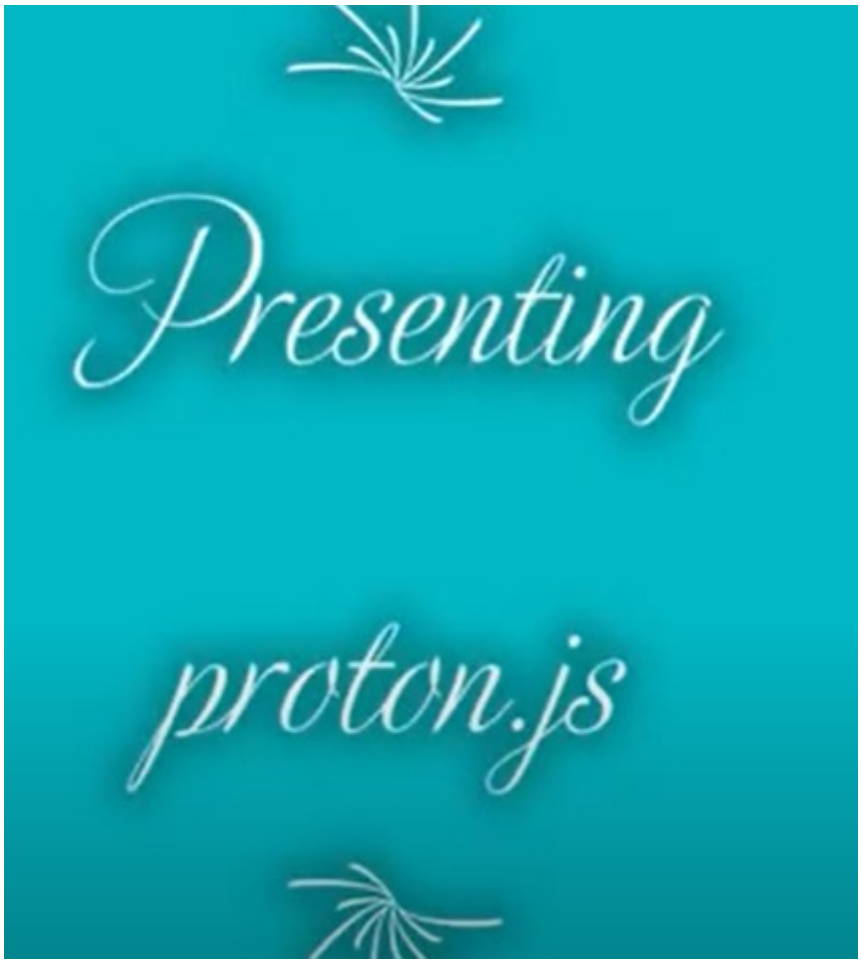
Task 89

Watch this video and put it working in your machine!

Link is:
https://www.youtube.com/watch?v=PHTtfAgHfBc

Task 90

Watch this video and put it working in your machine!



Link is:
https://www.youtube.com/watch?v=ZNtQzeUM2Xg

Task 91

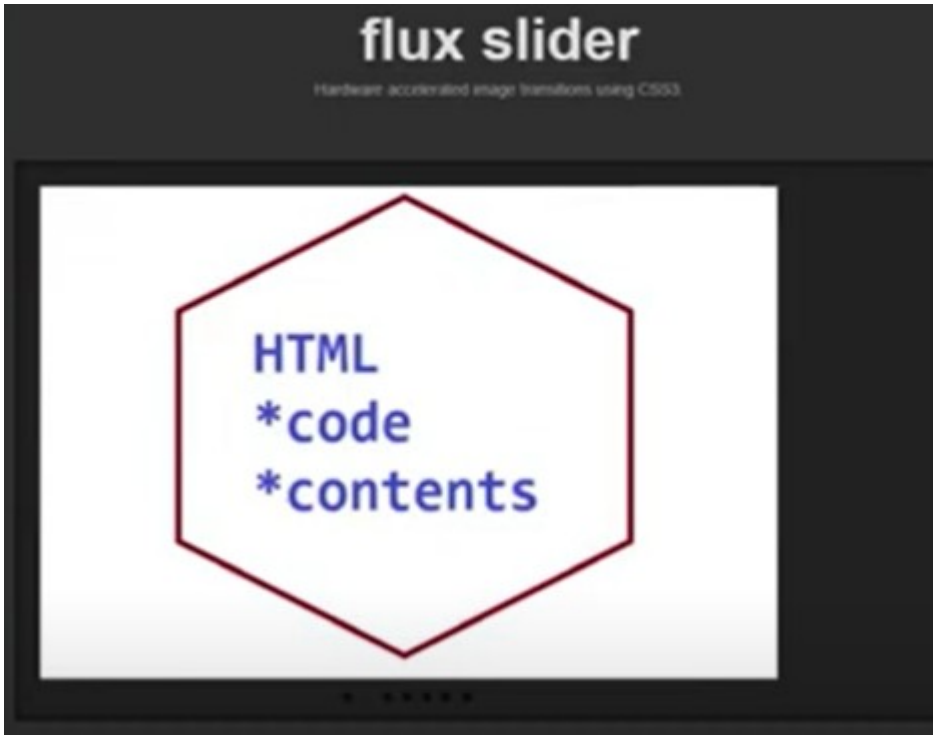
Watch this video and put it working in your machine!

Link is.

https://www.youtube.com/watch?v=k-4WFTjGeRg

Task 92

Watch this video and put it working in your machine!



Link is:
https://www.youtube.com/watch?v=93hsG8tzkuE

Task 93

Watch this video and put it working in your machine!

Link is:

https://www.youtube.com/watch?v=5wsyBMbUNqo

Task 94

Watch this video and put it working in your machine!

Link is
https://www.youtube.com/watch?v=s-OA4jE6vNA

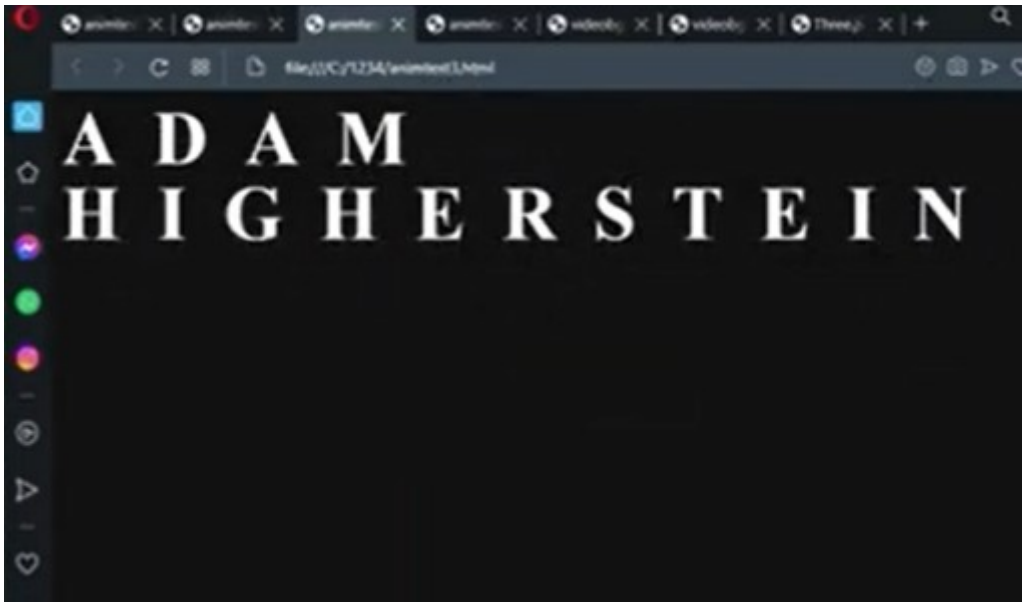
Task 95

Watch this video and put it working in your machine!

Link is:
https://www.youtube.com/watch?v=cxIEKuMpM10

Task 96

Watch this video and put it working in your machine!

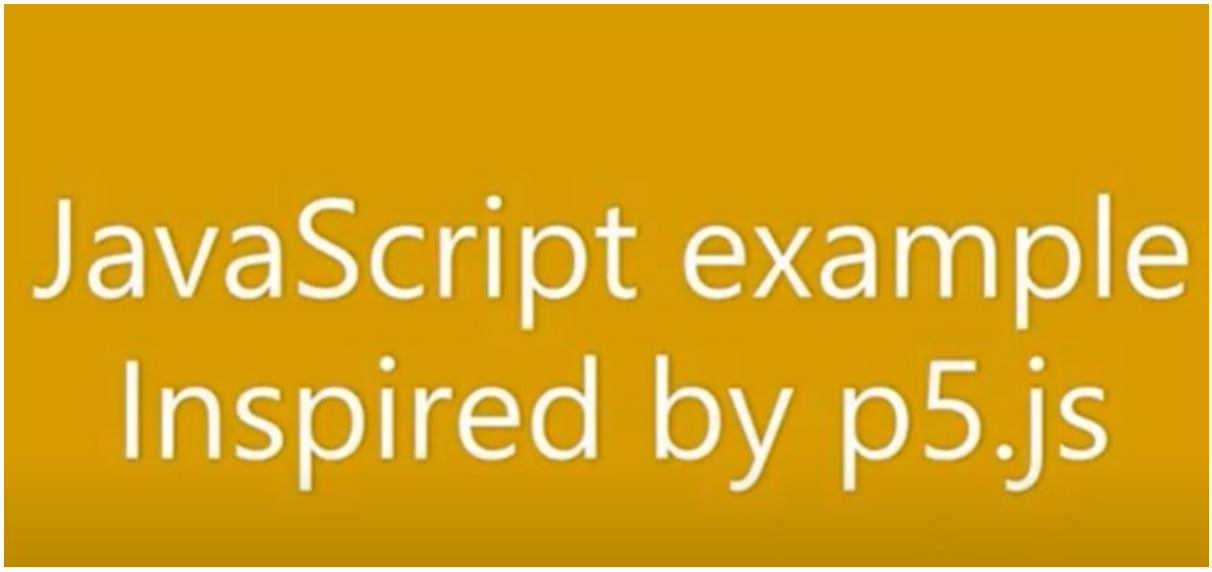


Link is:

https://www.youtube.com/watch?v=lQOZEw5xUfA

Task 97

Watch this video and put it working in your machine



Link is:
https://www.youtube.com/watch?v=p47Sxi6Kaso

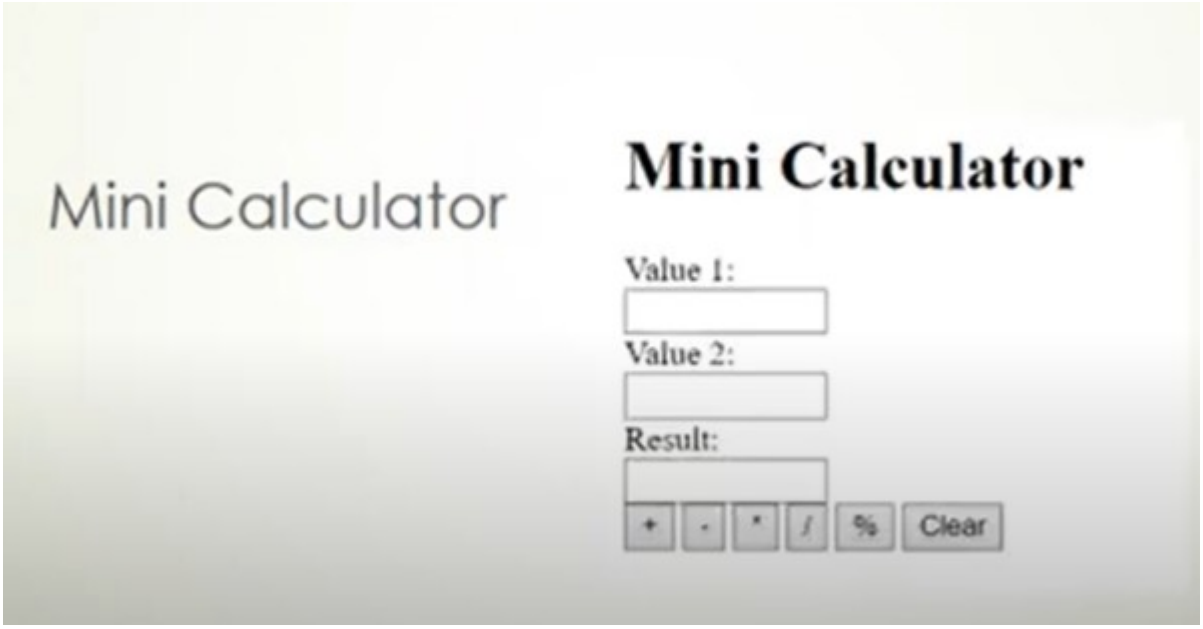
Task 98

Watch this video and put it working in your machine

Link is:
https://www.youtube.com/watch?v=hVFXL5gAlgI

Task 99

Watch this video and put it working in your machine



Link is:

https://www.youtube.com/watch?v=GBQxwdbvuL4

Task 100

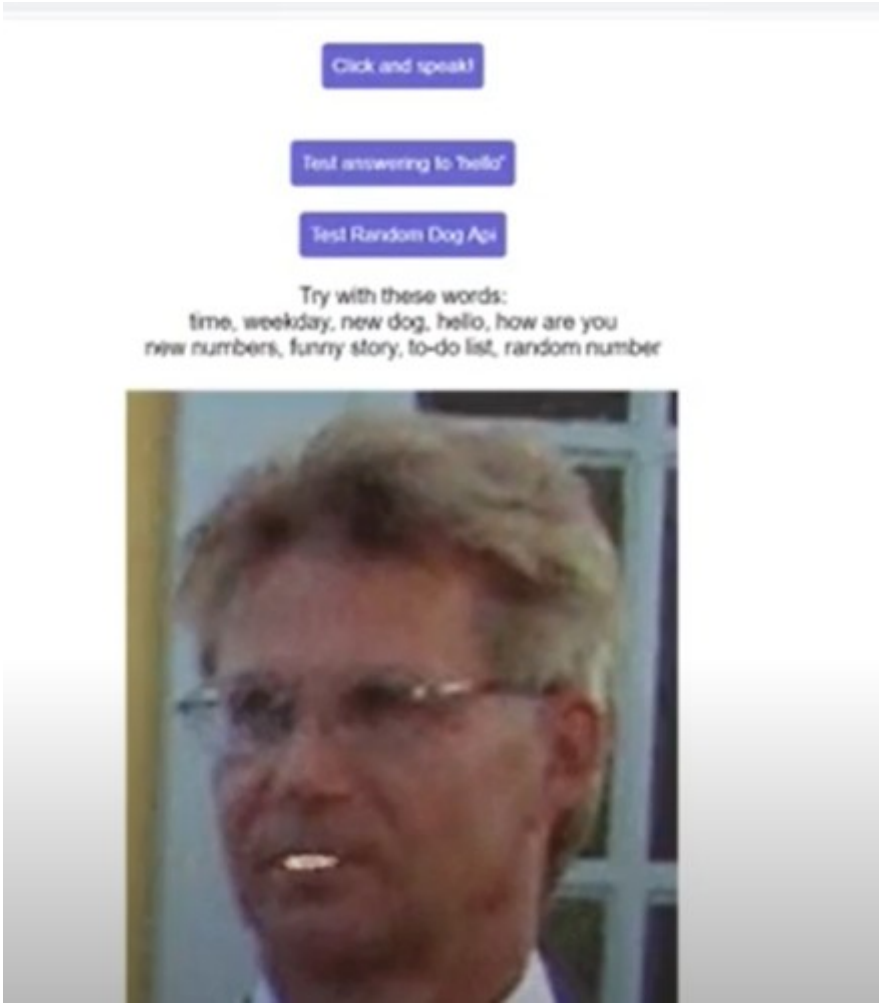
Try WEB APIs:

Watch these videos and put them working in your machine

Link is:

https://www.youtube.com/watch?v=Iis80tcHSW0

AND



Link is:

https://www.youtube.com/watch?v=7nTr4RTjOWA

SO this is it!

This ebook uses JavaScript language.

Check also free ebooks that use C#, C and Python!

Coming ebooks:
Gui/usability
Python libraries
OOP
Unity

I hope you can give me comments: how to improve this book?

Thank You!