MATLAB მეხსიერება:

Variables
Functions

ცვლადები:

Scalar
Vector
Matrix (vector)

```
>> A = 10;
>> B = zeros(1,A);
>> C = zeros(A,1);
>> D = zeros(A,A);
>> E = zeros(A,A,A);
>>
>> whos
  Name      Size                          Bytes  Class

  A         1x1                               8  double array
  B         1x10                             80  double array
  C        10x1                              80  double array
  D        10x10                            800  double array
  E        10x10x10                        8000  double array

Grand total is 1121 elements using 8968 bytes

>>
```

Output

```
>> A = zeros(1,10);
>> B = zeros(1,10)

B =

     0     0     0     0     0     0     0     0     0     0

>>
```

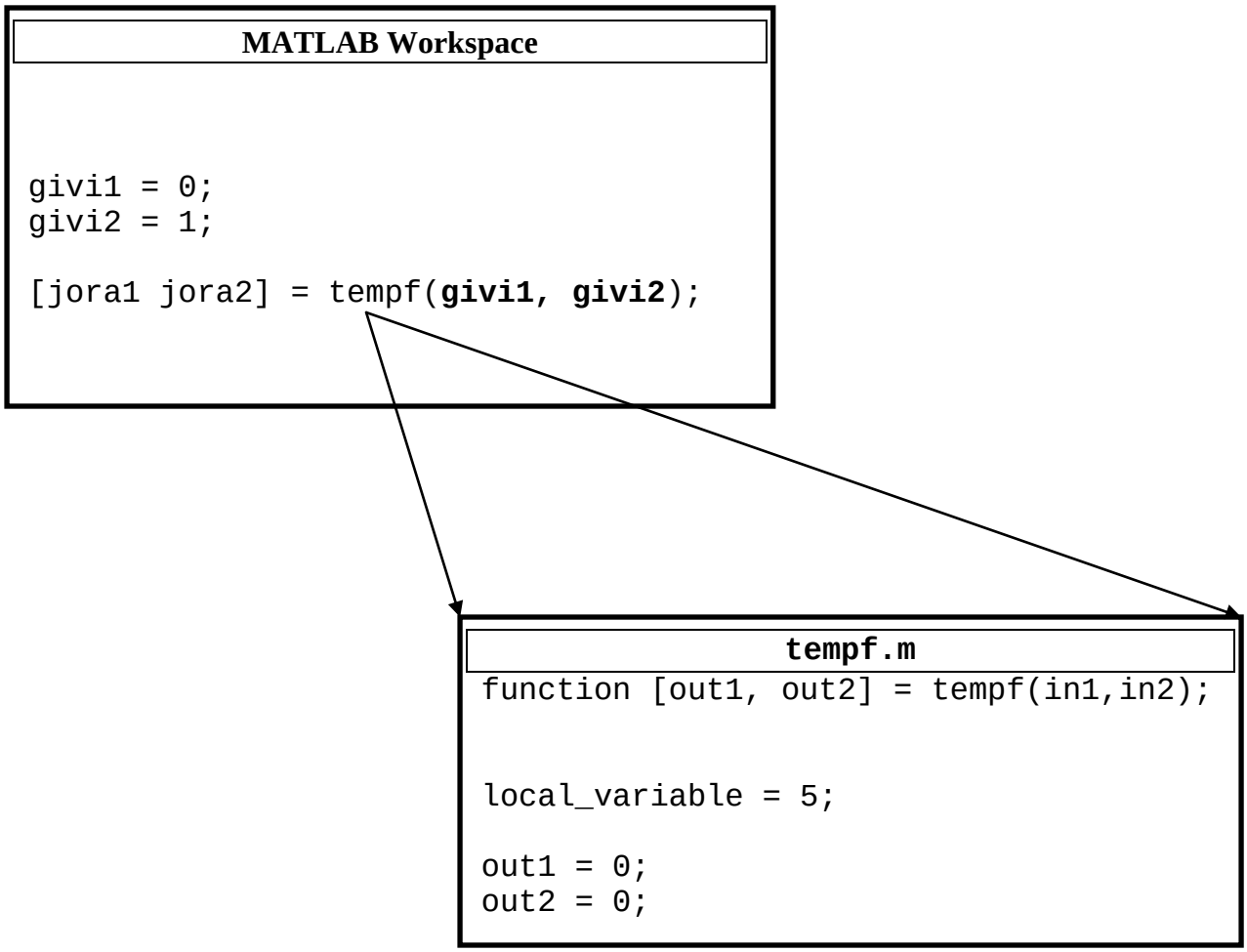
```
>> clear     % CLEAR VARIABLES
>> clear all % CLEAR VARIABLES AND FUNCTIONS
```

შეაფასეთ მაქსიმალური ზომის ცვლადი თქვენი კომპიუტერისათვის:

```
>> M=1e+9;
>> % Memory = 1Gb
>>

M=8*N^3;

>> N = (M/8)^(1/3)

N =

  500.0000

>>
```

3 განზომილებიანი მატრიცის მაქსიმალური სიდიდე: 500x500x500

Using Functions



Arithmetic operations

```
>> A = 10;
>> B = zeros(1,A);
>> C = zeros(A,1);
>> D = zeros(A,A);
>> E = zeros(A,A,A);
>>
>>
>>
>> A1 = A + 5 + A*5 + A/5 + A^5 + sin(A);
>> % SCALAR OPERATIONS
>>
>> B1 = B + B*5 + B.*B + B./B + B.^5 + sin(B);
>> % VECTOR OPERATIONS
>>
>> C1 = C + B';
>> % TRANSPOSE
>>
>>
>>
```

Logics

sample.m

```
for ind = 1:10,
    T(ind)=ind;
    Blabla=1;
    Blabla=2;
end
```

Graphics

plotting.m

```
for ind=1:10,
    T(ind)=ind;
end

figure(1);
plot(T,sin(T));
```

Check:

```
plot /

subplot
xlabel
ylabel

hold on / hold off


comet
```

Plot:

```
x=(0.1:0.1:10);  % vector of 0.1->10 with step 0.1
```

```
sin(x)/x     (red)
x^3          (blue)
x^2          (green)
```

```
on single plot;
```

Function:

phases.m

```
function [a1, a2] = phases(x);

a1 = sin(0.9*x);
a2 = cos(1.1*x);
```

write pirveli.m that will:

1. x=(0:0.1:10);
2. plot a1(x), a2(x) on single plot, figure(1);
3. plot a1(a2), a2(a1) on subplot(1,2,1) and subplot(2,1,2) of figure(2);
4. figure(3): animation a1(a2) with comet.

Vector Patch

```
>>
>> t = (0:1:100);
>>
>> F = sin(t).^2;
>>
>> figure(1);
>> plot(t(1:50),F(1:50));
>>
>> whos
  Name      Size                    Bytes  Class

  F         1x101                     808  double array
  t         1x101                     808  double array

Grand total is 202 elements using 1616 bytes

>>
```

Tensor Patches

```
>>
>> A = ones(100,100);
>> B = A(3,:);
>> C = A(:,21);
>> whos
  Name      Size                    Bytes  Class

  A       100x100                   80000  double array
  B         1x100                     800  double array
  C       100x1                       800  double array
  F         1x101                     808  double array
  t         1x101                     808  double array

Grand total is 10402 elements using 83216 bytes

>>
```

Check

sum
diff
rand

Tensor Length

```
>>
>> A = ones(10,20);
>> N1 =length(A(1,:));
>> N2 = length(A(:,1));
>>
>> N1

N1 =

    20

>> N2

N2 =

    10

>> whos
  Name      Size                    Bytes  Class

  A        10x20                     1600  double array
  N1        1x1                        8  double array
  N2        1x1                        8  double array

Grand total is 202 elements using 1616 bytes

>>
```

To do

1) t = (0:0.1:10)
2) F = exp(sin (t^2))
3) G = tan(sin (t^2))
4) Plot F(t) : t=(0-5)
5) Plot G(t) : t=(0-7)
6) H(t) = Integral F(t), t_min=0, t_max = t;
7) Plot H(t) : t=(0-10)
8) H1(t) = H(t)cos(t) + 0.01*(random number [0-1])
9) H2(t) = d/dt H1(t)
10) Plot on single graph:
    F(t) : t=0-10 (blue)
    H(t) : t=0-10 (red)
    H2(t) : t=0-10 (green)

Gradient

$$\nabla F = \frac{\partial F}{\partial x}\hat{i} + \frac{\partial F}{\partial y}\hat{j}$$

$$\nabla F = \frac{\partial F}{\partial x}\hat{i} + \frac{\partial F}{\partial y}\hat{j} + \frac{\partial F}{\partial z}\hat{k} + \ldots$$

```
FX = gradient(F)
[FX,FY] = gradient(F)
[FX,FY,FZ,...] = gradient(F)
```

Check:

gradient
contour
quiver

To do:

Calculate gradient: F(x,y) = x*exp(-x^2+y^2);
Contour plot; |grad F(x,y)|
Quiver plot;