Assignment 1

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Date: 12/3/2021

This is a template file for the first assignment to get started with running and publishing code in Matlab. Each problem has its own section (delineated by %%) and can be run in isolation by clicking into the particular section and pressing `Ctrl` + `Enter` (evaluate current section).

To generate a pdf for submission in your current directory, use the following three lines of code at the command window:

```
>> options.format = 'pdf';
>> options.outputDir = pwd;
>> publish('assignment1.m', options)
```

Problem 1

```
%a------------
x = 5;

%b------------
%y = 0.042;
y2 = 4.2 * 10^(-2);

%c------------
r = sqrt (pi);

%d------------
rate = 0.01;
t = 6;
T = 12;
money = 1000;

interest = money * (exp((rate*t)/T) - 1);

%e------------
% We can see that i is the immaginary number
a = 1 + i;
b = 1;
i = 2;
c = exp(i * pi);
d = exp(b * pi);
% We can see that i has now value 2
```

```
%f------------
c = exp(1i * pi);
%Using 1i Matlab returns the basic imaginary unit and we have as
 result -1
```

Problem 2

```
%a------------
A = [1 -2 0; -2 1 -2; 0 -2 1]

%b------------
Z = zeros(9)

%c------------
B = ones(9) * 3
%or
%B = zeros(9) + 3;

%d------------
C = ones(9) - eye(9)

%e------------
d = [1 2 3 4 5 4 3 2 1];
D = diag(d)

%f------------
e = 1:9;
E = [e', e', e', e', e']
```

```
A =

     1    -2     0
    -2     1    -2
     0    -2     1
```

```
Z =

     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
     0     0     0     0     0     0     0     0     0
```

```
B =
```

```
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
```

```
C =

     0     1     1     1     1     1     1     1     1
     1     0     1     1     1     1     1     1     1
     1     1     0     1     1     1     1     1     1
     1     1     1     0     1     1     1     1     1
     1     1     1     1     0     1     1     1     1
     1     1     1     1     1     0     1     1     1
     1     1     1     1     1     1     0     1     1
     1     1     1     1     1     1     1     0     1
     1     1     1     1     1     1     1     1     0
```

```
D =

     1     0     0     0     0     0     0     0     0
     0     2     0     0     0     0     0     0     0
     0     0     3     0     0     0     0     0     0
     0     0     0     4     0     0     0     0     0
     0     0     0     0     5     0     0     0     0
     0     0     0     0     0     4     0     0     0
     0     0     0     0     0     0     3     0     0
     0     0     0     0     0     0     0     2     0
     0     0     0     0     0     0     0     0     1
```

```
E =

     1     1     1     1     1
     2     2     2     2     2
     3     3     3     3     3
     4     4     4     4     4
     5     5     5     5     5
     6     6     6     6     6
     7     7     7     7     7
     8     8     8     8     8
     9     9     9     9     9
```

Problem 3

```
%a------------
```

```
flip(A,2)

%b------------
B(2,:) = ones(1,9)

%c------------
C(1,:) = []

%d------------
F = E(1:2,1:2)

%e------------
E(:,1) = flip(E(:, 1))
```

```
ans =

     0    -2     1
    -2     1    -2
     1    -2     0


B =

     3     3     3     3     3     3     3     3     3
     1     1     1     1     1     1     1     1     1
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3
     3     3     3     3     3     3     3     3     3


C =

     1     0     1     1     1     1     1     1     1
     1     1     0     1     1     1     1     1     1
     1     1     1     0     1     1     1     1     1
     1     1     1     1     0     1     1     1     1
     1     1     1     1     1     0     1     1     1
     1     1     1     1     1     1     0     1     1
     1     1     1     1     1     1     1     0     1
     1     1     1     1     1     1     1     1     0


F =

     1     1
     2     2


E =
```

```
     9     1     1     1     1
     8     2     2     2     2
     7     3     3     3     3
     6     4     4     4     4
     5     5     5     5     5
     4     6     6     6     6
     3     7     7     7     7
     2     8     8     8     8
     1     9     9     9     9
```

Problem 4

```
%a------------
[myeps] = geteps;
X = sprintf('\n myeps: %s \n eps: %s \n' , myeps, eps);
disp(X);

%b------------
[xmin] = getxmin;
Y = sprintf('xmin: %s \n realmin: %s \n', xmin, realmin);
disp(Y);

%c------------
[xmax] = getxmax;
Y = sprintf('xmax: %s \n realmax: %s', xmax, realmax);
disp(Y);

%d------------
%We can see that myeps is equal to eps. xmin and realmin are not the
 same
%because xmin is the smallest positive non-normalized number and
 realmin
%is the smallest positive normalized normalized.
%The first part of getxmax returns the value 8.988465674311580e+307
 that is
%the largest power of two that is less than Inf (2^1023). In order to
 find
%the largest finite number we multiply it with (2 - 2^(-52)).
```

```
 myeps: 2.220446e-16
 eps: 2.220446e-16

xmin: 4.940656e-324
 realmin: 2.225074e-308

xmax: 1.797693e+308
 realmax: 1.797693e+308
```

Published with MATLAB® R2020b