Homework M3:
Matlab Primer [1]
Chapters 1 and 2

1. List the output you would get from the following Matlab® commands:
   a) >> B = zeros(4);
      >> size(B)
   b) >> B = rand(1,3);
      >> length(B)
   c) >> B = ones(5,2);
      >> length(size(B))

2. If a = 2, find the value of the following
   a) a(ones(3,4))
   b) ones(a)
   c) zeros(3,a)

3. Which of the following Matlab® commands produce valid output (without an error message)? If the output is valid, write what it is.
   a) >> M = [eye(2); zeros(1,2)]
   b) >> M = [zeros(1), zeros(1,1); ones(2)]
   c) >> M = [zeros(2,1); eye(2,1)]
   d) >> M = [zeros(2), ones(2,3)]

4. Given *t* = 0 : 0.1 : 2*pi, list the exact code you would enter at the command prompt in Matlab® to compute the following functions for all values of *t* using only one command:
   a) $\sqrt{5t}$
   b) $e^{-1/t}$
   c) $\dfrac{3+\ln(4t)}{7*(3+|\tan(3t)-2|)}$

   where ln = $\log_e$ and $|x|$ is absolute value

5. Given *t* = 0 : 0.001 : 0.1, list the exact code you would enter at the command prompt in Matlab® to compute the following function for all values of *t* using only one command:
   $5e^{-t/0.01}\cos(2\pi\bullet 100t) - 5e^{-t/0.01}\sin(2\pi\bullet 100t) + 10$

For the problems 6 through 8 and 10, use the following definition of matrix A:

```
>> A = magic(3)

ans =

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

6. Find the results of executing the following Matlab® commands:
   a) >> min(A(1:2,2:3))'
   b) >> sort(A')
   c) >> sum([sum(A(1:2,:));sum(A')])

7. Find the results of executing the following Matlab® commands:
   a) >> find(A<=3)
   b) >> A>2
   c) >> A(A>2)
   d) >> A((A>2)+1)

8. Answer the following questions and explain your answers.
   a) What property of A causes the equation A(A') = A(A)' to be valid?
   b) What is the value of A(A(2,1))?
   c) What is the value of A(A(2,1),A(2,1))?
   d) What is the value of A after the following command: >> A(min(A)) = []

9. Write a display command to output the following message:
   Matlab's transpose symbol is ' (Hermitian transpose)

10. Write down a Matlab® command to build a string that looks like another Matlab® command that is the concatenation of the following strings:
    a) The following characters: A(1,:) = [
    b) The values in A(1,:) separated by spaces
    c) The following character:]

    Note: do Not figure out what A(1,:) is and use those numbers. Instead, have Matlab® convert the values in A(1,:) into strings using num2str( ).

REF: [1] The Mathworks, Inc, *Matlab® Primer,* Natick, MA: The Mathworks, Inc, 2012.

Selected answers:

1.b) ans =

```
     3
```

2.a)

```
ans =
     2     2     2     2
     2     2     2     2
     2     2     2     2
```

3.c) >> M = [zeros(2,1); eye(2,1)]

```
valid
M =
     0
     0
     1
     0
```

d) >> M = [zeros(2), ones(2,3)]

```
valid
ans =
     0     0     1     1     1
     0     0     1     1     1
```

4.b) >> exp(-1 ./ t)

5. First part of solution: 5*exp(-t/0.01).*cos(2*pi*100*t) ...

6.c)

```
ans =
    26    21    28
```

7.d)

```
ans =
     3     8     3
     3     3     3
     3     3     8
```

8.d)

```
A =
     1     5     9     6     7     2
```