Question Set 1

1. Create a vector of the whole numbers multiples of 5, between 255 and -75.

2. Let a = [25 –16 4 231 20 - 35].
Based on the elements of a, create the vectors a1,b1,c1,d1:
a1= Subtract 6 from each element of a.
b1= Add 10 to just the odd-index elements of a.
c1= Compute the cube of each element of a.
d1= Compute the 5th root of each element of a.

3. Let a = [-11 3 22 6 8]' and b = [4 -11 3 -25 7]' .
Based on the elements of a,b, create the vectors a1,b1,c1,d1,e1:
(read about the matlab function **sum**: help **sum**)

a1= Add the sum of the elements of a to each element of b.
b1= Raise each element of a to the power specified by the corresponding element in b.
c1= Divide each element of b by the corresponding element in a.
d1= Multiply each element in a by the corresponding element in b.
e1= Add up the elements in d1 and assign the result to a variable called "res".

4. Create 4 vectors a,b,c,d with the elements ...
Assume given last elements:
a. 2, 4, 6, 8, ...
b. 10, 8, 6, 4, 2, 0, -2, -4
c. 1, 1/2, 1/3, 1/4, 1/5, ...
d. 0, 1/2, 2/3, 3/4, 4/5, ...

5. For a given n, create a vector x with the elements,

$x_n = (-1)^{n+1}/(2n-1)$

What is the sum of the elements of the version of this vector that has 100 elements.

Given a *vector*, t, of length n, write down the MATLAB expressions that will correctly compute the following:

a. $\ln(2 + t + t^2)$
b. $e^t(1 + \cos(3t))$
c. $\cos^2(t) + \sin^2(t)$
d. $\tan^{-1}(1)$ (this is the *inverse* tangent function)
e. $\cot(t)$
f. $\sec^2(t) + \cot(t) - 1$
(use matlab help for : log,exp,cos,sin,…)

Test that your solution works for t = 1:0.2:2

Given the array A = [2 4 1 ; 6 7 2 ; 3 5 9], provide the commands needed to

a. assign the first row of A to a vector called x1
b. assign the last 2 rows of A to an array called y
c. compute the sum of the elements of each column of A
d. compute the sum of the elements of each row of A

4. In each of the following questions, evaluate the given MATLAB code fragments for each of the cases indicated. Use MATLAB to check your answers. Write the answers.

```
a.   if n > 1            a. n = 7   m = ?
m = n+1          b. n = 0   m = ?
else               c. n = -10 m = ?
m = n - 1
end
```

```
b.   if z < 5            a. z = 1    w = ?
w = 2*z          b. z = 9    w = ?
elseif z < 10      c. z = 60   w = ?
w = 9 - z        d. z = 200  w = ?
elseif z < 100
w = sqrt(z)
else
w = z
end
```

```
c.   if T < 30           a. T = 50    h = ?
h = 2*T + 1      b. T = 15    h = ?
elseif T < 10       c. T = 0     h = ?
h = T - 2
else
h = 0
end
```

```
d.   if 0 < x < 10           a. x = -1   y = ?
y = 4*x              b. x = 5    y = ?
elseif 10 < x < 40    c. x = 30   y = ?
y = 10*x             d. x = 100  y = ?
else
y = 500
end
```

Question Set 2

1. Plot a graph of y = x*sin(x) for x values between 0 and 100.

2. a.) The study of air pollutants is important in order to maintain breathable air while utilizing technology for societal improvement. Sulfur dioxide is emitted from coal-fired power plants and is distributed around the world through upper air currents. Below is the data measured since 1900 of SO_2 emissions (metric tons $x10^6$) nationwide.
Plot SO_2 vs. year.

```
year = [00 05 10 15 20 25 30 35 40 45 50 55 60 65 70 73 75 80 88]

so2 = [9.1 12.7 15.7 18.4 19.2 21.1 19.2 15.4 18.7 23.6 19.3 19.0
20.2 24.3 29.0 30.0 26.8 24.2 22.0]
```

b.) Fit a curve to the original data set using the MATLAB commands polyfit and polyval. Try a few different model orders until you find one that gives a reasonably good representation of the data. You should be able to find a line that fits nearly every data point. (Hint... you need to increase the model order to improve the fit.)
What is the equation for the curve?

c.) Plot the original data set and the curve that you generated on the same graph. Be sure to label the graph appropriately and include a legend.

3. Write a function that asks for a temperature (in degrees Fahrenheit) and computes the equivalent temperature in degrees Celcius.

4. Use MATLAB to compute the resulting coefficients of the product of two polynomials:

$$y = (3x^6 + 2x^4 + 2x^3 + x - 9)(x^{10} - \sqrt{2}x^6 - 3x^5 + x)$$