Part A (Matlab Tutorial)

Exercise 5: let $p(t) = -1 + 3t - 2t^3$ -that is, p is a polynomial. Use Matlab to compute the value of p at each of the entries of x. The first entry of this matrix should be $p(7)$ since the first entry of x is 7. The last entry of this matrix should be $p(2)$ since 2 is the last entry of x

Solution:

```
x = [7 1 8 2]

x =

     7     1     8     2

p = -1+3*x-2*x.^3

p =

  -666     0 -1001   -11
```

Using the *polyval* function:

```
x = [7 1 8 2]

x =

     7     1     8     2

p = [-2 0 3 -1]

p =

    -2     0     3    -1

polyval(p,x)

ans =

  -666     0 -1001   -11
```

Exercise 7: Plot the curves $y = Ce^x$ for $C = 1$,$C = 1/2$, $C = 0$, $C = -1/2$ and $C = -1$ the range $-1 \leq x \leq 1$ all in the same figure. Add a helpful legend in your plot.

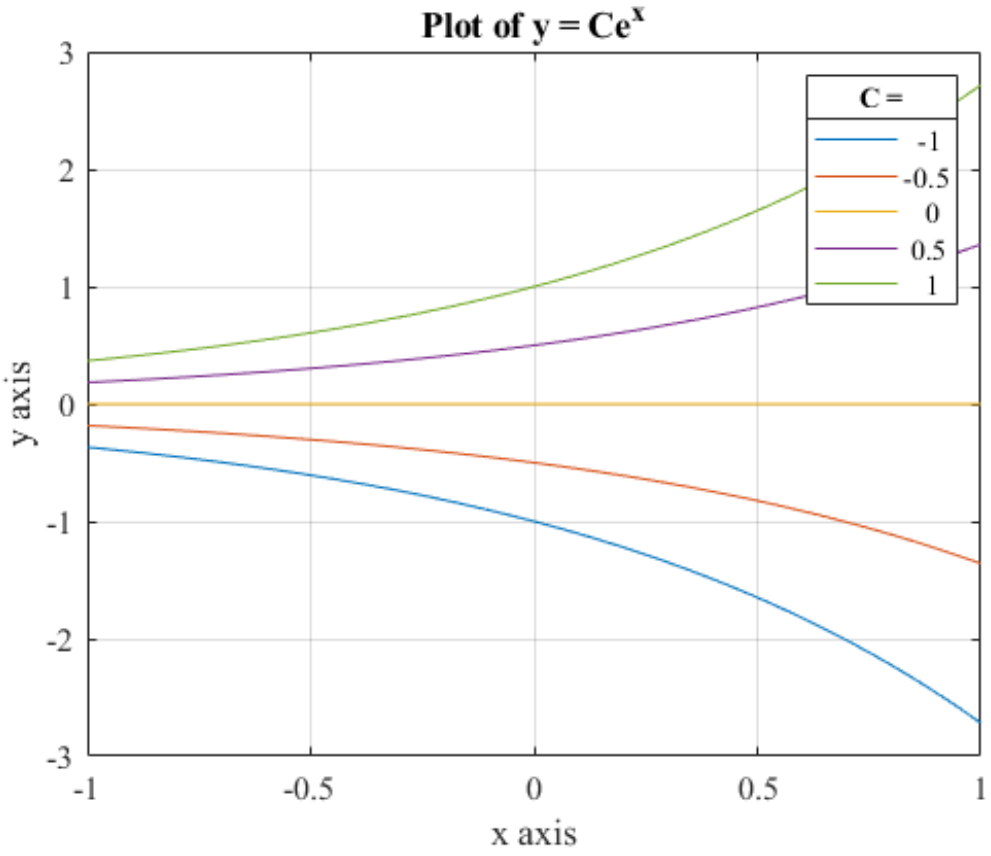
Solution:

```
c = [-1:.5:1]

c =

   -1.0000   -0.5000         0    0.5000    1.0000

x = [-1:.01:1];
y = c'.*exp(x);
plot(x,y)
legend(num2str(c'))
title(legend,'C =')
xlabel('x axis')
ylabel('y axis')
set(gca,'FontName','Times')
set(gca,'FontSize',12)
title('Plot of $y = Ce^x$')
title('Plot of y = Ce^x')
grid
```



Exercise 9: Let,

$$logistic(x) = \frac{1}{1 + e^{-x}}.$$

1. Following the example from section use matlab to define a function *logistic* for this function.

   Answer:

```
f = inline('(1+exp(-x)).^(-1)')

f =

     Inline function:
     f(x) = (1+exp(-x)).^(-1)
```

2. Verify that your function works correctly b computing $logistic(0), logistic(1)$ and $logistic([0, 1])$. Do you obtain the right answers? (Hint: if you have a error when you test with vector input think about dot operators)

Answer:

```
f(0)

ans =

    0.5000

f(1)

ans =

    0.7311

x = [0:.1:1]

x =

  Columns 1 through 7

         0    0.1000    0.2000    0.3000    0.4000    0.5000
0.6000

  Columns 8 through 11

    0.7000    0.8000    0.9000    1.0000

f(x)

ans =

  Columns 1 through 7

    0.5000    0.5250    0.5498    0.5744    0.5987    0.6225
0.6457

  Columns 8 through 11

    0.6682    0.6900    0.7109    0.7311
```

Note the .^(-1) notation. When applied to a vector .^(-1) inverts each entry individually, achieving the desired result. Also note that the notation 1./ would achieve the

same result.

3. Plot the logistic function over the range $-2 \leq x \leq 2$. Add a red square or diamond that marks the point $(1, logistic(1))$

Answer:

```
x = [-2:01:2];
hold on
plot(x,f(x))
plot(1,f(1),'rs')
hold off
```