Part A (Matlab Tutorial)

Exercise 5: let $p(t) = -1 + 3t - 2t^2$ -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

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

p =

-78 0 -105 -3

Using the *polyval* function:

$$x = [7 \ 1 \ 8 \ 2]$$

x =

7 1 8 2

 $p = [-2 \ 3 \ -1]$

p =

-2 3 -1

polyval(p,x)

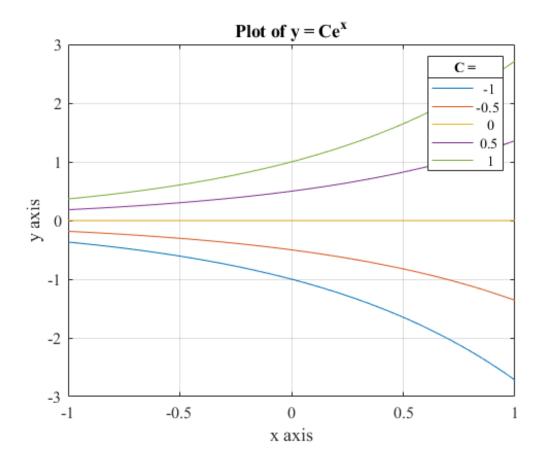
ans =

-78 0 -105 -3

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

Solution:

```
c = [-1:.5:1]
c =
                                    0.5000
   -1.0000
              -0.5000
                               0
                                               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
               0.8000
                          0.9000
                                     1.0000
    0.7000
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 $-2 \le x \le 2$. 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
```

