BIL 113E Introduction to Scientific and Engineering Computing

HW 1

1. Evalute the function $y = \dfrac{x^2 \cos(\pi x)}{(x^3+1)(x+2)}$ for x = 0 to x = 1 using 200 steps.

   Hint: Use the "plot" command at the end of the solution.

2. Evalute the function $y = \dfrac{x}{x + \frac{1}{x^2}}$ for x = 3 to x = 5 in steps of 0.01.

   Hint: Use the "plot" command at the end of the solution.

3. The upward velocity of the rocket is measured with respect to time, and the data is given in the following table:

   Velocity vs. time data for a rocket

Time, t (s)	Velocity, v (m/s)
5	106.8
8	177.2
12	279.2

   We wanted to approximate the velocity profile by:
   $$v(t) = at^2 + bt + c \, , 5 \le t \le 12$$

   Construct the set of linear equations and solve the equation for the coefficients, $a, b, c \; in \; v(t)$.

   Hint: We find the unknown coefficients by creating a matrix of coefficients, taking the inverse of this matrix, and multiplying it by the resulting vector (use "inv" command).