1. (10 points) Give examples to explain matlab functions, poly and polyval.
2. Polynomial interpolation. Let x=[-1 1 3 5], y=[105 -15 9 -15], and q denote a polynomial that well interpolates four points represented by x and y.
   A. (5 points) State requirement of q.
   B. (10 points) Let p_j be a polynomial, where j=1,…,4, satisfying
   $$p_j(x(j)) = 1 \; and \; p_j(x(i)) = 0 \quad if \quad i \neq j,$$
      i. Write codes to determine p_1 that satisfies $p_1(x(1))=1$ and $p_1(x(i))=0$ for i=2,…,4. Note that p_1 is termed as the first Lagrange polynomial determined by four elements of x.
      ii. Write codes to determine q_1 that $q_1(x(1))=y(1)$ and $q_1(x(i))=0$ for i=2,…,4
   C. (5 points) Let $q=q_1 + q_2 + q_3 + q_4$. Does q satisfy requirement in problem A? Why?
   D. (5 points) Write codes to determine polynomial q.
3. (20 points) Let $x=[x_1\, x_2 \ldots x_n]$ and $y=[y_1\, y_2 \ldots y_n]$.
   A. Assume $y_i = ax_i + b + e_i$, where e_i denotes a random noise.
      i. Let E(a,b) denote the mean square error of approximating y_i by $ax_i + b$ for all i. E(a,b)= ?
      ii. Derive the normal equation of minimizing E(a,b) with respect to a and b.
   B. Assume $y_i = ax_i^2 + bx_i + c + e_i$.
      i. Express the mean square error, E(a,b,c), of approximating y_i by $ax_i^2 + bx_i + c$ for all i.
      ii. Derive the normal equation of minimizing E(a,b,c)
4. (10 points)Draw a flow chart to illustrate minimizing E(a,b,c) with respect to a, b and c for given x and y
5. (10 points) Write a matlab function to implement the flow chart.
6. (25 points) Let a=3, b=-2 and c=1. Use the matlab function in 5 to find a, b and c and plot the following figure. Checked by_____time: