MATLAB Exercise 6 – Polynomial

1. Generate the following polynomials as row vectors

   1) $f = x^5 + 3x - 4$ 2) $f = x^3$

   3) $f = x(x-1)(x+3)$ 4) $\begin{vmatrix} x-1 & 2 \\ 3 & x+4 \end{vmatrix}$

2. Represent polynomial $f = (x-1)(x-2)(x-3)$ in the following forms

   1) row vector 2) sym 3) pretty 4)

3. Evaluate the polynomial $f = (x-1)(x-2)(x-3)$ at

   1) point 4 2) point 1 to 10

4. Execute following codes compare the results and the difference between subs and polyvalm. Why? Here eye(2) means [1 0; 0 1]

   1) >> syms x; mat = eye (2); sym_pol_a = x^2+1; subs(sym_pol_a, mat)
   2) >> clear; mat = eye (2); pol_a = [1 0 1]; polyvalm(pol_a, mat)
   3) replace the code pol_a = [1 0 1] with syms x; pol_a = x^2+1 in 2). How about the result? Why? How to correct it if pol_a = x^2+1 should be used?

5. Let $f(x) = x^2 + x - 4$, $g(x) = 2x^2 + 1$. Compute

   1) $f(x) + g(x)$ 2) $f(x)g(x)$ 3) $f(g)$ 4) $\dfrac{f(x)}{g(x)}$

   Help In command window input **help conv(or deconv)**, learn the different usage of this function

6. Let $f(x) = x^2$, $g(x) = 3x^5 + 1$. Compute following formula by two different methods (i.e. operations of matrix & operations of sym objects).

   1) $f(x) + g(x)$ 2) $f(x)g(x)$

7. Please display the result of Ex6

   1) sym form and the terms ordered by descending powers
   2) as row vector

8. Generate matrices which are

   1) a symmetric positive definite matrix
   2) a symmetric positive semi-definite matrix

   and check the matrices by roots function and ‘ operation.

9. Compute the quotient and remainder of $\dfrac{f(x)}{g(x)}$ and display the results in sym form, where

   $f(x) = x^5 + 2x^4 - 3x^3 - x^2 - 2x + 3$, $g(x) = x^4 + x^3 - 5x^2 - 6$.

10. *Try to compute the greatest common factor (最大公因式) of $f(x)$ and $g(x)$ in Ex9.