Polynomials 1

1. Use synthetic division to evaluate each of the following :

   (a) Given that $f(x) = 3x^4 - x^3 + 2x^2 - 6$, find $f(2)$ and $f(-1)$.

   (b) Given that $y = x^5 + 2x^3 - 4x + 2$, find y when $x = -1$.

2. Find the quotient and remainder when dividing :

   (a) $x^3 + 7x^2 + 4x - 1$ by $x + 1$

   (b) $x^3 - 2x^2 + 3x - 10$ by $x - 2$

   (c) $2x^3 - x^2 - 3x - 1$ by $2x + 1$

3. Prove that $x + 2$ is a factor of $x^3 - x^2 - 10x - 8$ and hence find the other factors.

4. Show that $x^3 - 2x = 5$ has a root between 2 and 3 and find the root to two decimal places

5. Factorise fully : (a) $x^3 - 21x + 20$ (b) $4x^3 - 8x^2 + x + 3$

6. (a) Find the value of k so that $x^3 + 5x^2 - 4x + k$ is exactly divisible by $x - 2$.

   (b) For what value of c is $x - 1$ a factor of $x^3 + cx^2 - 5x + 6$?

   (c) For what values of a and b are $x + 2$ and $2x - 1$ both factors of $4x^3 + ax + b$?

7. Solve the equations : (a) $3x^3 - 7x^2 + 4 = 0$

   (b) $x^3 = 7x + 6$

8. Prove that $x + 2y$ is a factor of $x^4 + 10xy^3 + 4y^4$

9. From the graph find an expression for the f(x)