ZEROES OF POLYNOMIALS

1. Find the exact zeroes of the following polynomials:

(a) $f(x) = -2x + 10$ (b) $f(x) = \frac{7}{3}x - 5$

2. Graph the polynomials in problem 1, using the x and y-intercepts. What is the connection between the zeroes and the x-intercepts?

3. Find the exact zeroes of the following polynomials:

(a) $f(x) = 2x^2 - 16$ (b) $f(x) = -4x^2 + 5x$

4. Graph the polynomials in problem 3 by hand. What is the connection between the zeroes and the x-intercepts?

5. Find the exact zeroes of the following polynomials:

(a) $f(x) = x^2 - 3x - 10$ (b) $f(x) = 2x^2 + 16$

6. Find the exact and approximate zeroes of the following polynomials:

(a) $y = 3x^2 - 4x + 1$ (b) $g(x) = 4x^2 - 2x + 1$ (c) $f(x) = -2x^2 + 4x + 3$

7. Find the exact zeroes of the following polynomials:

(a) $f(x) = -3x(x-2)(x+4)$ (b) $y = (2x+3)(x^2+1)(x^2-4)$ (c) $g(x) = 4(3x-5)(x+2)^2$

What are the degrees of the polynomials in (a), (b) and (c)? How does the degree of a polynomial relate to the total number of zeroes (real or complex) of the polynomial for each of the problems (a), (b), and (c)?

8. State the **Fundamental Theorem of Algebra** in your own terms, but accurately.

9. Find the exact zeroes of the following polynomials:

(a) $y = 3x^3 + 4x^2 - 6x - 8$ (b) $y = 5x - x^3$

10. Graph the following polynomials using a calculator. Then find the *approximate* zeroes:

(a) $f(x) = x^3 + 3x^2 - 4x - 1$ (b) $y = 2x^4 - 11x^3 - 7x^2 + 40x - 13$

Also find the approximate intervals on the x-axis on which f is increasing or decreasing.

11. Find two different polynomials of degree three having 2, -3, and 4 as its zeroes. Provide your answer in the expanded form.

12. A certain polynomial is of degree four, and *all* its zeroes are real numbers. The distinct zeroes are 1, -3, and 5. Is it possible to find a polynomial satisfying those conditions?

13. Consider the polynomial $f(x) = 2x^3 - 5x^2 - 4x + 8$.

(a) Find the approximate zeroes of f, using a suitable graph (four decimal places)
(b) Find the intervals on the x-axis on which f is increasing or decreasing (four decimal places)
(c) Solve the inequality $f(x) \geq 0$ (four decimal places)