Section 2.3   Polynomial Equations

- The **real roots** of a polynomial equation $P(x) = 0$ correspond to the x-intercepts of the graph of the polynomial function $P(x)$.

- The x-intercepts of the graph of a polynomial function correspond to the real roots of the related polynomial equation. They can also be called the zeros of the function.

- If a polynomial equation is factorable, the roots are determined by factoring the polynomial, setting its factors equal to zero, and solving each factor.

- If a polynomial equation is not factorable, the roots can be determined from the graph using technology.

Example: Solve the following polynomials by factoring. Then use the x-intercepts and the end behaviour of the functions to sketch a graph.

a) $-x^3 + x^2 + 6x = 0$ b) $2x^3 - x^2 - 18x + 9 = 0$ c) $x^3 - 3x^2 + x = 3$

Example: Solve the following using the factor theorem. Round to 2 decimal places where necessary.

a) $2x^3 + 3x^2 - 11x = 6$

b) $x^3 + 3x^2 - 11x + 7 = 0$

Example: The volume, V, in cubic centimeters, of a block of wood that a sculptor uses to carve a wolf can be modelled by $V(x) = 9x^3 + 3x^2 + 120x$, where x represents the thickness of the block, in centimeters. What maximum thickness of wolf can be carved from a block of wood with a volume of 1332 cm³?