

## 4.1/4.2 Solving Polynomial Equations and Inequalities

**Example 1:** Solve

$$2x^3 - 3x^2 - 5x + 6 = 0$$

Determine when  $f(x) > 0$ ?

**Example 2:** Solve

$$x^3 - 4x^2 - x + 12 = 0$$

**Example 3: Solve**

$$3x^4 - 12x^3 - 5x^2 = -20x$$

**Example 4:** Lelanie's family is planning to build a silo for grain storage, identical to those they have already on their farm. The cylindrical portion of those they currently have is 15 m tall, and the silo's total volume is  $684\pi \text{ m}^3$ .  
What are the possible values for the radius of the new silo?



$$V = V_{\text{cylinder}} + V_{\text{hemisphere}}$$
$$V = \pi r^2 h + \frac{1}{2} \left( \frac{4}{3} \pi r^3 \right)$$



**Example 5:** Solve the following.  $t^4 + 2t^2 < -1$

**Example 6:** The path of two orcas playing in the ocean were recorded by the same oceanographers. The first orca's path could be modelled by the equation

$$h(t) = 2t^4 - 18t^3 + 28t^2 - 250t + 250,$$

and the second by

$$h(t) = 19t^3 - 199t^2 + 298t - 182,$$

where  $h$  is their height above/below the water's surface in cm and  $t$  is the time during the first 8s of play.

Over this 8 second period, when is orca two higher than orca one?

**Example 6:** The path of two orcas playing in the ocean were recorded by the same oceanographers. The first orca's path could be modelled by the equation  $h(t) = 2t^4 - 18t^3 + 28t^2 - 250t + 250$ , and the second by  $h(t) = 19t^3 - 199t^2 + 298t - 182$ , where  $h$  is their height above/below the water's surface in cm and  $t$  is the time during the first 8s of play. Over this 8 second period, at what times were the two orcas at the same height or depth?

$$2t^4 - 18t^3 + 28t^2 - 250t + 250 = 19t^3 - 199t^2 + 302t - 182$$



