

How Can I Use the Graph of a Polynomial to Factor and Solve the Function?

First of all, it's very important to remember that the _____ of the graph are the _____ of the function. These will also be referred to as _____ or _____. They all mean the same thing!

Secondly, you must learn and apply the **Zero Product Property** which states

$$\text{If } a \cdot b = 0, \text{ then } a = 0 \text{ or } b = 0$$

EX 1: Solve $(x + 3)(x - 5) = 0$

$$\begin{array}{l} x + 3 = 0 \\ -3 \quad -3 \\ x = -3 \end{array} \quad \begin{array}{l} x - 5 = 0 \\ +5 \quad +5 \\ x = 5 \end{array}$$

EX 3: $4x(x + 6) = 0$

$$\begin{array}{l} 4x = 0 \\ 4 \quad 4 \\ x = 0 \end{array} \quad \begin{array}{l} x + 6 = 0 \\ -6 \quad -6 \\ x = -6 \end{array}$$

EX 5: $x^2 + 7x + 10 = 0$

$$(x + 5)(x + 2) = 0$$

$\begin{array}{r} 10 \\ 5 \times 2 \\ 7 \end{array}$

$$\begin{array}{l} x + 5 = 0 \\ -5 \quad -5 \\ x = -5 \end{array} \quad \begin{array}{l} x + 2 = 0 \\ -2 \quad -2 \\ x = -2 \end{array}$$

EX 2: $(2x + 1)(6x - 7) = 0$

$$\begin{array}{l} 2x + 1 = 0 \\ -1 \quad -1 \\ \frac{2x}{2} = \frac{-1}{2} \\ x = -\frac{1}{2} \end{array} \quad \begin{array}{l} 6x - 7 = 0 \\ +7 \quad +7 \\ \frac{6x}{6} = \frac{7}{6} \\ x = \frac{7}{6} \end{array}$$

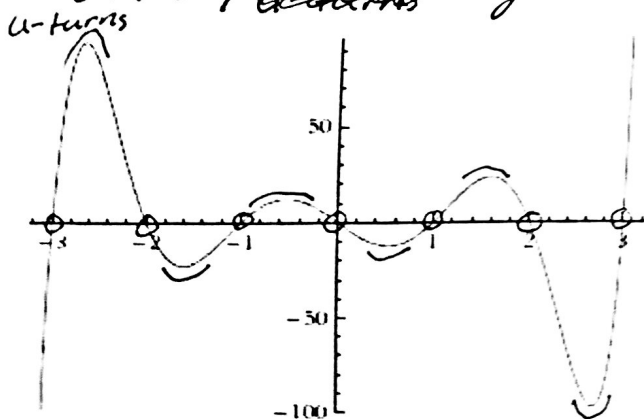
EX 4: $9x^2 - 25 = 0$

EX 6: $3x^2 - 12 = 0$

Let's see what role the graph of the polynomial plays...

EX 1 *Odd degree*

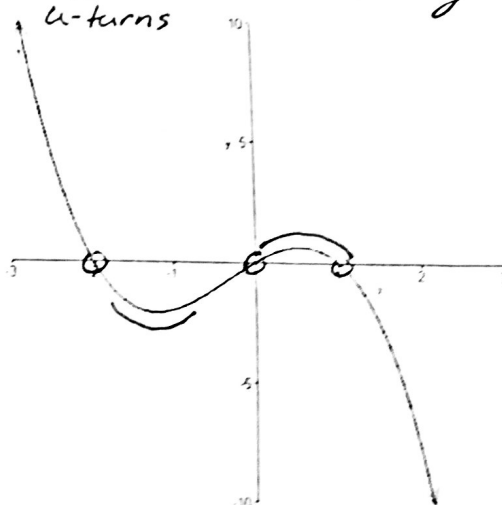
Positive Leading Coefficient
 $6 + 1 = 7$ *Least degree*



$$x = -3, -2, -1, 0, 1, 2, 3$$

EX 2

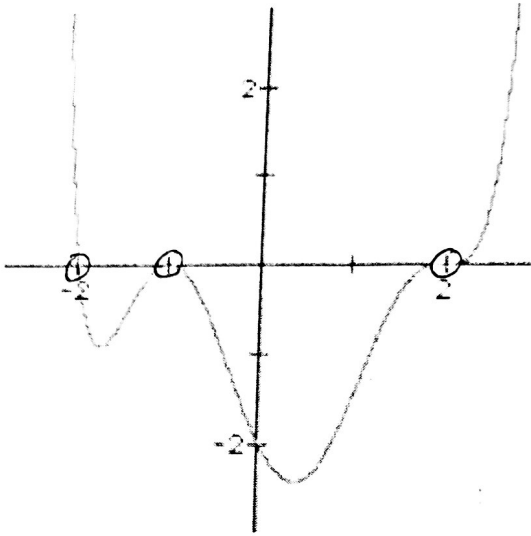
Degree: Odd
LC: negative
 $2 + 1 = 3$ *Least degree*



$$x = -2, 0, 1$$

$$x = \pm 3, \pm 2, \pm 1, 0$$

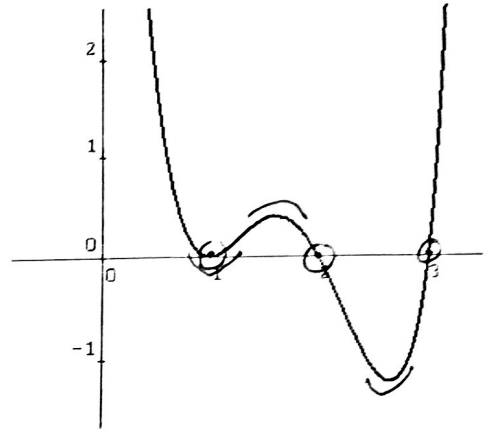
EX 3



$x = -2, -1$ mult. 2, 2 mult. 3

EX 4

Degree: even
 LC: positive
 Least degree: $3+1 = 4$



$x = 1$ multiplicity of 2, 2, 3

$x = 1, 1, 2, 3$

EX 5

