Math Worksheet: Graph Polynomial (1)

a) Show that x = 2 is a zero of f(x) and determine its multiplicity.

$$f(x) = x^3 - x^2 - 8x + 12$$

Divide $f(x)$ by $x-2$

$$\begin{array}{r|l} x-2 & x^2+x-6 \\ \hline & x^3-x^2-8x+12 \\ & x^3-2x^2 \\ \hline & \quad x^2-8x+12 \\ & \quad x^2-2x \\ \hline & \quad\quad -6x+12 \\ & \quad\quad -6x+12 \\ \hline & \quad\quad 0 \end{array}$$

Divide the quotient by $x-2$

$$\begin{array}{r|l} x-2 & x+3 \\ \hline & x^2+x-6 \\ & x^2-2x \\ \hline & \quad 3x-6 \\ & \quad 3x-6 \\ \hline & \quad 0 \end{array}$$

b) Factor f(x) completely and find all zeros.

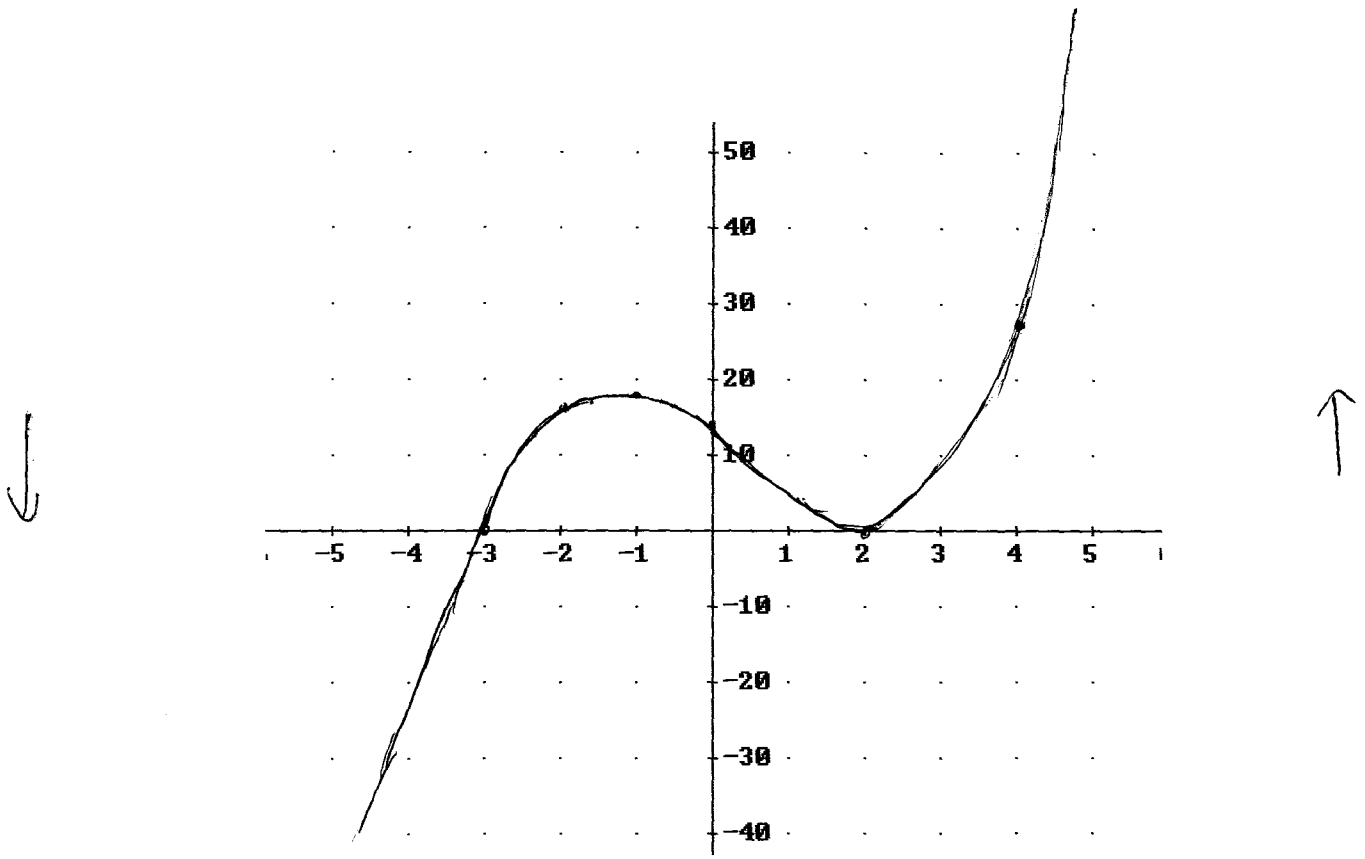
$$f(x) = (x-2)(x^2+x-6)$$

$$= (x-2)(x-2)(x+3)$$

Zeros are : $x = 2$ with multiplicity 2.

$x = -3$ " " 1.

c) Sketch the graph of f(x) and label the x and y intercepts.



More points

x	f(x)
0	12
-1	18
-2	16
4	24

degree = 3

leading coefficient = 1, > 0

hence $f(x) \to +\infty$ as $x \to +\infty$

$f(x) \to -\infty$ as $x \to -\infty$.

Note: at $x = 2$, the graph touches but does not cut the x-axis.

$\therefore$ $x = 2$ is a zero of multiplicity 2.