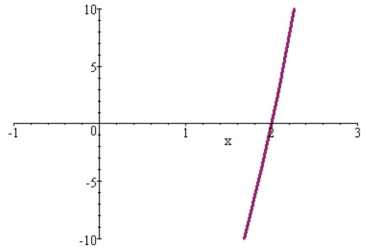
Given the following function and part of its graph, how could you find the other two solutions without a graphing calculator?

$y = x^3 + 6x^2 - x - 30$ $= x^2+8x+15$

$x-2$



The graph shows that 2 is a zero so (x-2) is a factor. Divide by (x-2) to find the other factor.

Now find the zeros of this which can be done by factoring.

$x^2+8x+15$

$=(x+5)(x-3)$

$x = -5, 3$

Use a graping calculator to help you find all three solutions to this cubic.

$x^3 + 3x^2 + 7x + 5 = 0$

$x+1$

Graph to find that -1 is a zero which means (x+1) is a factor.

$-1 \mid 1 \quad 3 \quad 7 \quad 5$

$\quad\quad -1 \quad -2 \quad -5$

$1x^2+2x+5 \quad 0$

Solve this quadratic using the quadratic formula to get:

$x = -1 \pm 2i$

Given 3 is a zero of this cubic, find the other two solutions.

$2x^3 - 11x^2 + 21x - 18 = 0$

$x-3$

$3 \mid 2 \quad -11 \quad 21 \quad -18$

$\quad\quad 6 \quad -15 \quad 18$

$2 \quad -5 \quad 6 \quad 0$

$2x^2-5x+6$

Use Quadratic Formula to find the last two solutions:

$x = \frac{5 \pm i\sqrt{23}}{4}$

Given 3 is a zero, find the other four solutions.

$x-3$ is a factor

$x^5 - 3x^4 + 6x^3 - 18x^2 + 8x - 24 = 0$

$x-3$

$3 \mid 1 \quad -3 \quad 6 \quad -18 \quad 8 \quad -24$

$\quad\quad 3 \quad 0 \quad 18 \quad 0 \quad 24$

$1 \quad 0 \quad 6 \quad 0 \quad 8 \quad 0$

$x^4+6x^2+8 = (x^2+4)(x^2+2)$ $x = \pm 2i, \pm i\sqrt{2}$