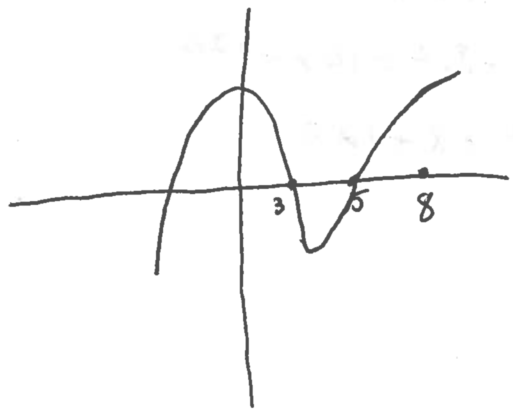
Paul Witt Activity 4

## Problem 1

Sketch a cubic function (third degree polynomial function $y = p(x)$ where $p(x) > 0$ on the intervals $(-\infty,\ 3)$ and $(5, 8)$. Then determine a formula for your function.

**SKETCH:**

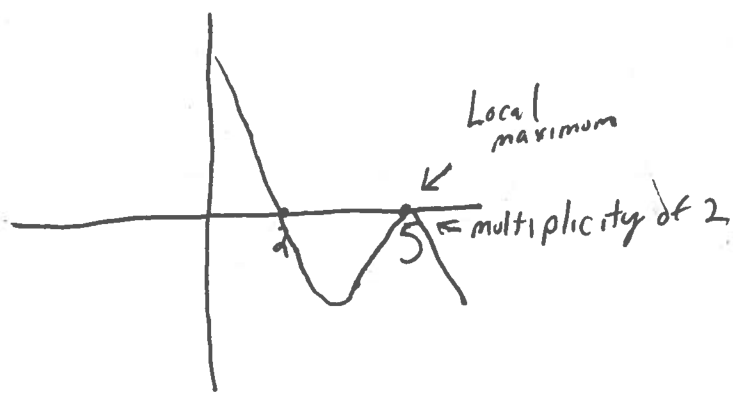



**Formula:** $p(x) = x^3 - 10x^2 + x + 120$ (see below)

## Problem 2

Sketch a cubic function (third degree polynomial function $y = p(x)$ with two distinct zeros at $x = 2$ and $x = 5$ and has a local maximum located at $x = 5$. Then determine a formula for your function. [Hint: you will have one double zero]

**SKETCH:**




**Formula:** $p(x) = -a(x-2)(x-5)^2$

PROBLEM 1

ROOTS $= x-3,\ x=5,\ x=8$

$p(x) = (x+3)(x-5)(x-8)$

$p(x) = (x-8)(x^2-2x-15)$

$p(x) = x^3-2x^2-15x-8x^2+16x+120$

$p(x) = x^3-10x^2+x+120$

## Problem 3

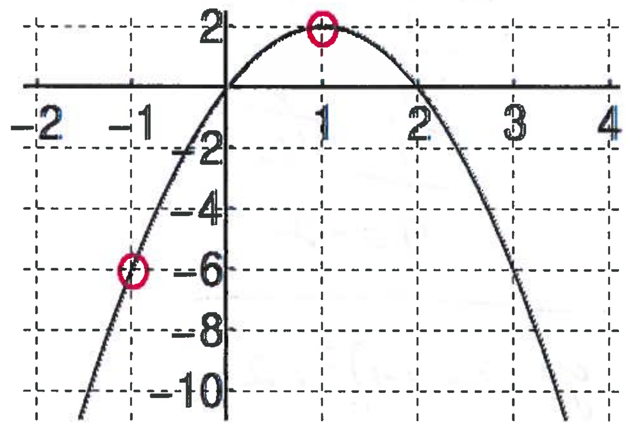
Find the formula for the quadratic function whose graph has a vertex of $(1,\ 2)$ and passes through the point $(-1, -6)$.

Step 1:
Use the coordinates of the vertex to write $p(x)$ in the form:

$$p(x) = a(x - h)^2 + k$$

where $a$ is not known.

Step 2:
Use the coordinates of the second point to solve for the leading coefficient, $a$.

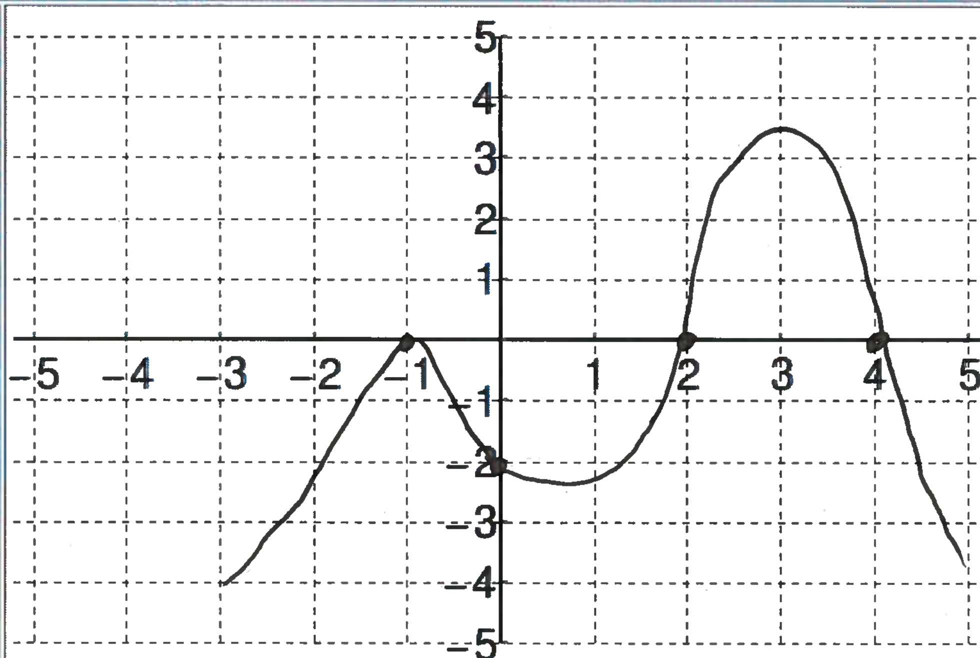



$p(x) =$ $-2(x-1)^2 + 2$ (see below)

## Problem 4

Sketch the graph of a polynomial function with the following properties:

- Increasing on $(-\infty, -1)$
- Decreasing on $(3, \infty)$
- Relative maximum at $x = -1$
- Relative maximum at $x = 3$
- $x$-intercepts at $x = -1, 2,$ and $4$
- $y$-intercept at $y = -2$



Problem 3

$$-6\ a(-1(-1))^2+2$$

$$a(4)+2$$

$$4a+2=-6$$

$$\underline{-2}\quad\underline{-2}$$

$$\frac{4a}{4}\quad\frac{-8}{4}$$

$$a=-2$$

$$y=-2(x-1)^2+2$$