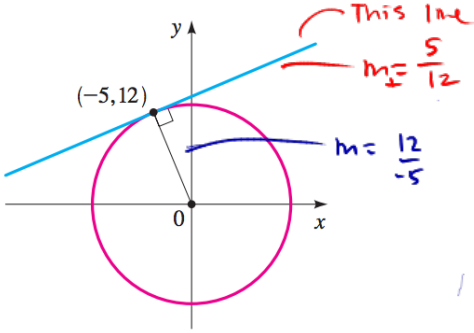
Warm-up Problem Find the equation of the line



This line has slope $m_\perp$, & contains $(-5,12)$

$m_\perp = \frac{5}{12}$

$m = \frac{12}{-5}$

$y - 12 = \frac{5}{12}(x - (-5))$

$y = \frac{5}{12}x + \frac{169}{12}$

Functions

1. To graph piecewise functions, simply think of the function as two different functions and graph each one over ITS GIVEN DOMAIN.

2. Sketch the graph of the function

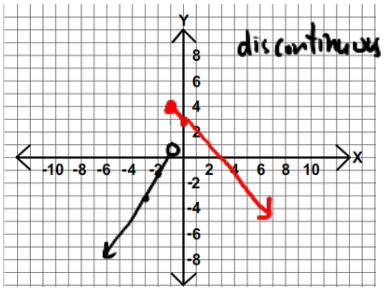
$$f(x) = \begin{cases} 2x+3 & \text{if } x < -1 \\ 3-x & \text{if } x \geq -1 \end{cases}$$

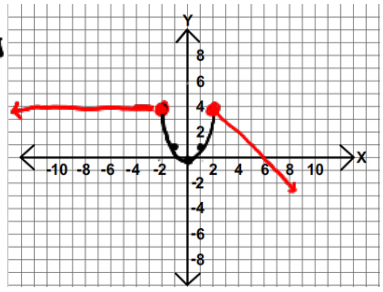
3. Sketch the graph of the function

$$f(x) = \begin{cases} 4 & \text{if } x < -2 \\ x^2 & \text{if } -2 \leq x \leq 2 \\ -x+6 & \text{if } x > 2 \end{cases}$$

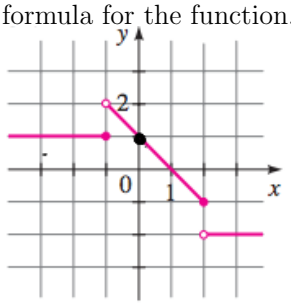
$2x+3$ or $x < -1$

$3-x$ or $x \geq -1$



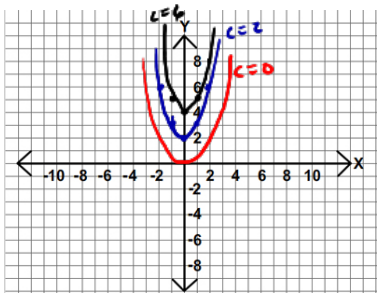


4. The graph of a piecewise defined function is shown below. Find a formula for the function.

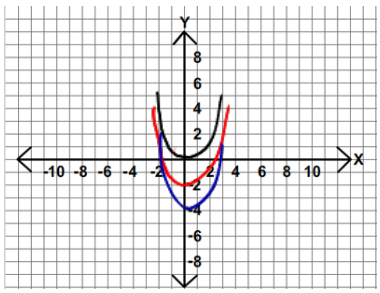


$$f(x) = \begin{cases} 1 & x \le -1 \\ -x+1 & -1 < x \le 2 \\ -2 & x > 2 \end{cases}$$

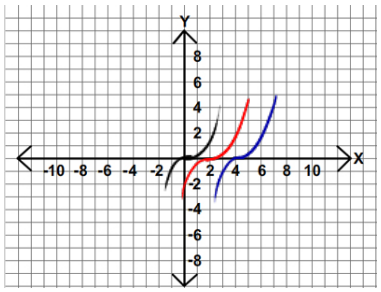
5. Plot the family of functions on the same axes.



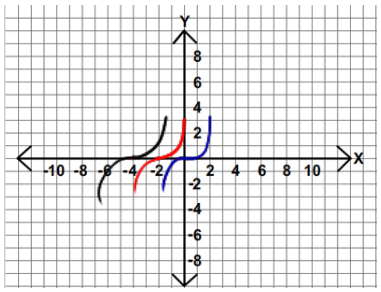
(c) $f(x) = x^2 + c$ for $c = 0, 2, 4, 6$



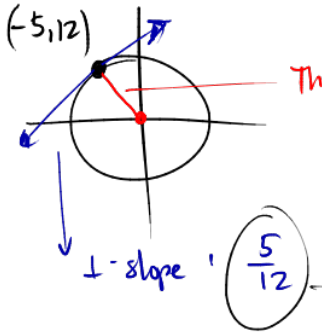
(d) $f(x) = x^2 + c$ for $c = 0, -2, -4, -6$



(e) $f(x) = (x - c)^2$ for $c = 0, 1, 2, 3, 4$



(f) $f(x) = (x - c)^3$ for $c = 0, -2, -4$



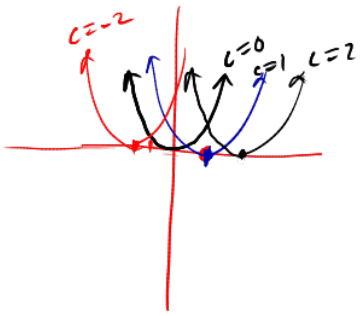
$y - y_1 = m(x - x_1)$

$y - 12 = \frac{5}{12}\left(x - (-5)\right) = \frac{5}{12}x + \frac{25}{12}$

$+12 \cdot \frac{12}{12}$

$+12$

$$y = \frac{5}{12}x + \frac{169}{12}$$



$(x-c)^2$

$c=0$	$\rightarrow$	x^2	
$c=1$	$\rightarrow$	$(x-1)^2$	Right 1 unit
$c=2$		$(x-2)^2$	R 2 units
$c=-2$		$(x+2)^2$	left 2 units

$f(x) \longrightarrow a \cdot f(x)$ is a vertical stretch / shrink ($a>1$ / $a<1$)

$f(x) \longrightarrow f(ax)$ horizontal stretch / shrink ($a>1$ / $a<1$)

Even function: $f(x) = f(-x)$: all even exponents

Odd function: $f(-x) = -f(x)$: all odd exponents

$x^3 +$ is neither.

Ex: $f(x) = x^3 + 3x$

$f(-x) = (-x)^3 + 3(-x)$

$-x^3 - 3x$

$= -(x^3 + 3x)$ $\therefore$ odd

(original)