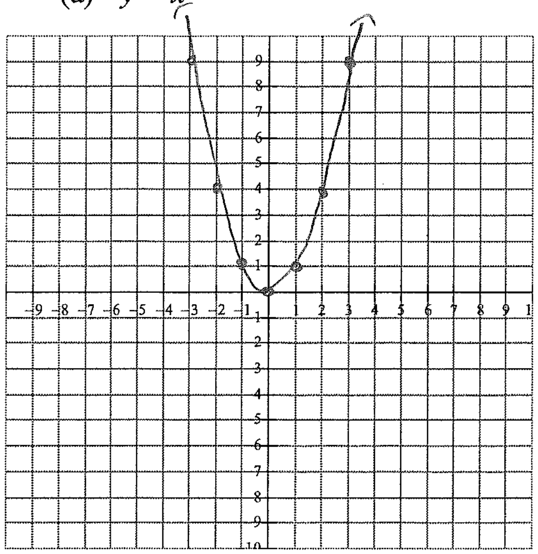
Pre-Calculus 11 Review

Name: KEY

1. For each of the following functions sketch the graph on the axes provided and state the domain and range for each function.

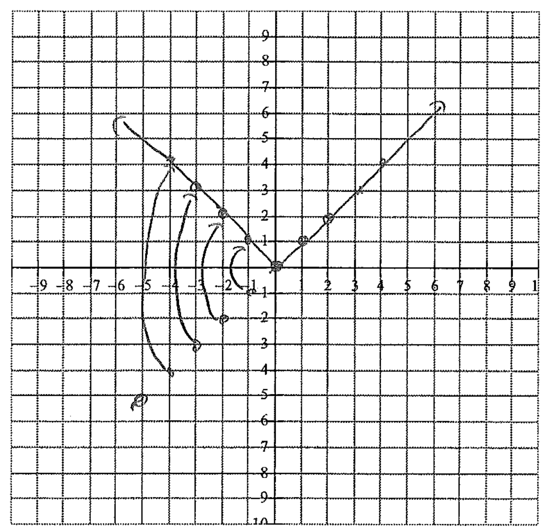
(a) $y = x^2$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 0, y \in \mathbb{R}\}$

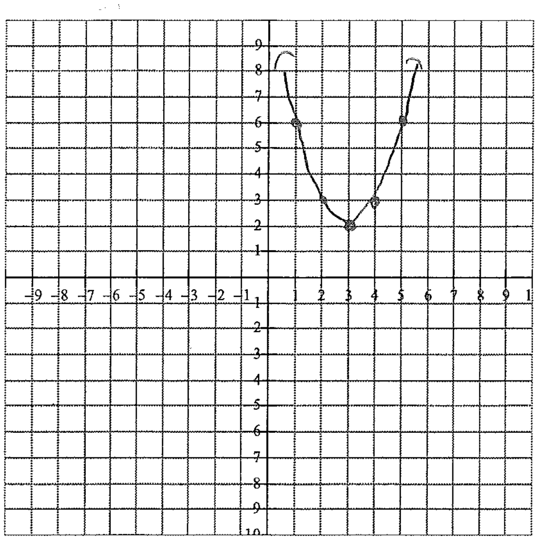
(b) $y = |x|$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 0, y \in \mathbb{R}\}$

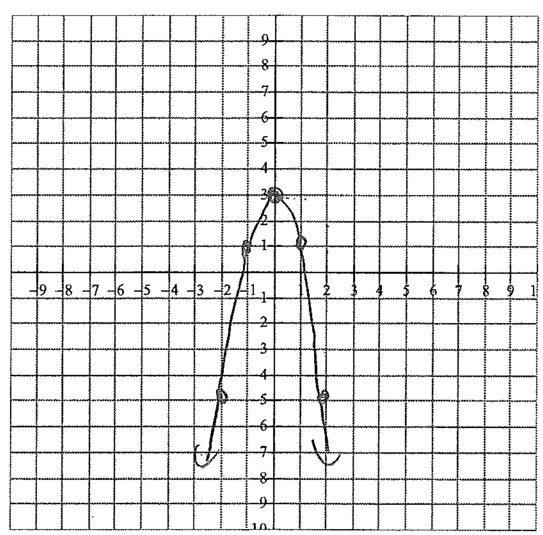
(c) $y = (x-3)^2 + 2$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 2, y \in \mathbb{R}\}$

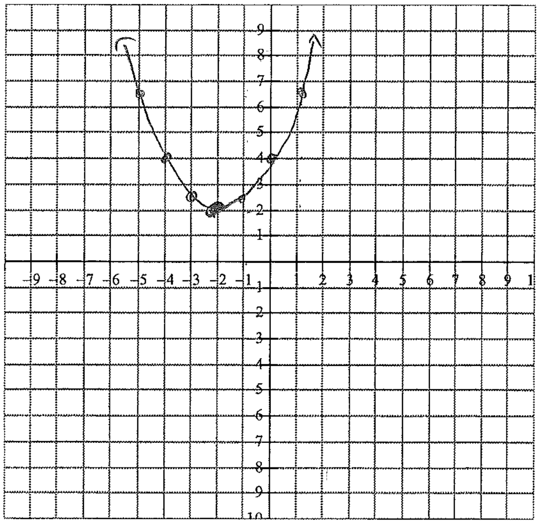
(d) $y = -2x^2 + 3$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \leq 3, y \in \mathbb{R}\}$

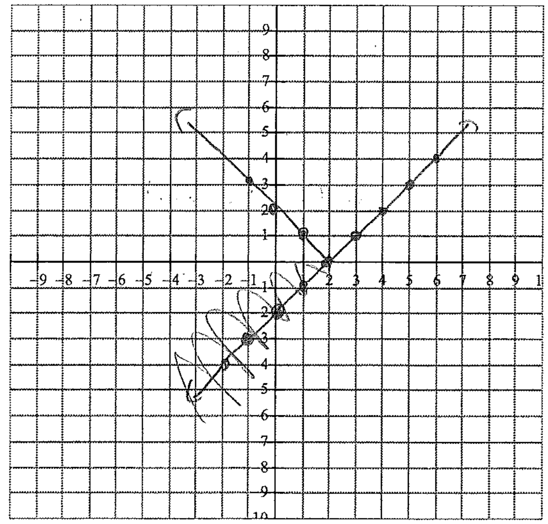
(e) $y=\frac{1}{2}(x+2)^2+2$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 2, y \in \mathbb{R}\}$

(b) $y=|x-2|$



Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq 0, y \in \mathbb{R}\}$

2. Rewrite the following quadratics in vertex form and sketch the graph.

(a) $y=(x^2+6x)+5$

$\left(\frac{6}{2}\right)^2$

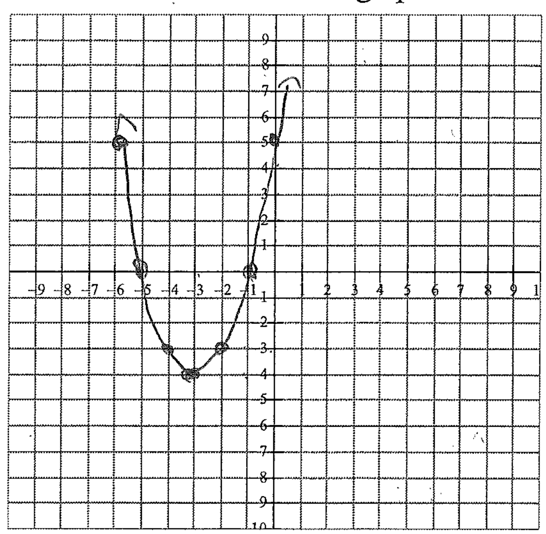
$(3)^2$

9

$y=(x^2+6x+9-9)+5$

$y=(x^2+6x+9)-9+5$

$y=(x+3)^2-4$



(b) $y=(-3x^2-12x)-9$

$\left(\frac{4}{2}\right)^2$

$(2)^2$

4

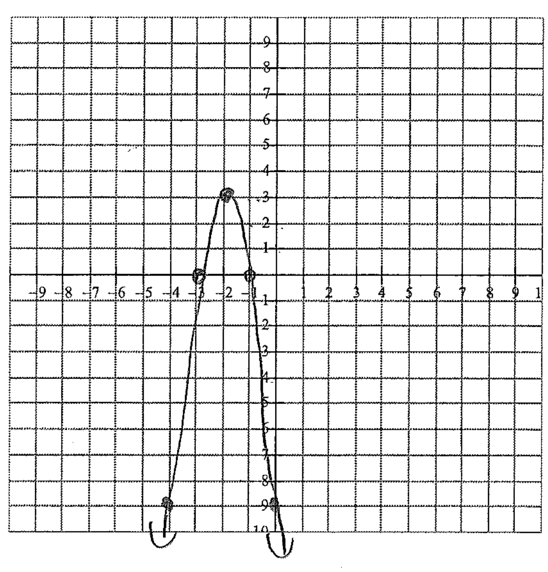
$y=-3(x^2+4x\quad)-9$

$x\cdot -3$

$y=-3(x^2+4x+4-4)-9$

$y=-3(x^2+4x+4)+12-9$

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



3. Rewrite the following equations in vertex form and state the vertex, axis of symmetry, direction of opening, max or min, domain and range.

(a) $f(x) = (x^2 - 10x) + 6$

$\left(\frac{-10}{2}\right)^2$

$(-5)^2$

25

$(x^2 - 10x + 25 - 25) + 6$

$(x^2 - 10x + 25) - 25 + 6$

$(x - 5)^2 - 19$

Vertex: $(5, -19)$

Axis of Symmetry: $x = 5$

Direction of Opening: Up

Max or min: min $y = -19$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq -19\}$

Notice connection to Vertex

(b) $f(x) = (x^2 + 5x) - 2$

$\left(\frac{5}{2}\right)^2$

$\frac{25}{4}$

$\left(x^2 + 5x + \frac{25}{4} - \frac{25}{4}\right) - 2$

$\left(x^2 + 5x + \frac{25}{4}\right) - \frac{25}{4} - \frac{2 \times 4}{1 \times 4}$

$\left(x + \frac{5}{2}\right)^2 - \frac{25}{4} - 8/4$

$\left(x + \frac{5}{2}\right)^2 - \frac{33}{4}$

Vertex: $\left(-\frac{5}{2}, -\frac{33}{4}\right)$

Axis of Symmetry: $x = \frac{-5}{2}$

Direction of Opening: Up

Max or min: min $y = -33/4$

Domain: $\{x \mid x \in \mathbb{R}\}$

Range: $\{y \mid y \geq -\frac{33}{4}, y \in \mathbb{R}\}$

4. Factor the following polynomials.

(a) $x^2 - x - 6$

m: -6 $\quad -3, 2$

A: -1

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

(b) $x^2 + 2x - 35$

m: -35 $\quad +7, -5$

A: 2

$(x+7)(x-5)$

(c) $2x^2 + 11x + 5$

m: $2 \cdot 5 = 10$ $\quad 10, 1$

A: 11

$\underline{2x^2 + 10x} + \underline{1x + 5}$

$2x(x+5) + 1(x+5)$

$(x+5)(2x+1)$

(d) $3x^2 + 7x - 6$

m: $3 \cdot -6 = -18$ $\quad +9, -2$

A: 7

$3x^2 + 9x - 2x - 6$

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

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

5. Solve the following quadratic equations.

(a) $3m^2 + 2m = 0$

$m(3m+2)=0$

$m=0$

$3m+2=0$

$3m=-2$

$m=-2/3$

(b) $x^2 - 2x - 11 = 4$

$x^2-2x-15=0$

$M:-15 \quad -5,+3$

$A:-2$

$(x-5)(x+3)=0$

$x-5=0$

$x=5$

$x+3=0$

$x=-3$

(c) $3p^2 + 8p - 9 = 2p$

$3p^2+6p-9=0$

$3(p^2+2p-3)=0$

$M:-3 \quad 3,-1$

$A:2$

$3(p+3)(p-1)$

$p+3=0$

$p=-3$

$p-1=0$

$p=1$

(d) $\frac{2}{x+3} - \frac{3}{x-2} = 2$ L.C.D. $=(x+3)(x-2)$

$\frac{2}{\cancel{(x+3)}}\cancel{(x+3)}(x-2) - \frac{3}{\cancel{(x-2)}}(x+3)\cancel{(x-2)} = 2(x+3)(x-2)$

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

$2x-4-3x-9=2(x^2+x-6)$

$-1x-13=2x^2+2x-12$

$0=2x^2+3x+1$

$M:2\cdot1=2 \quad 2,1$

$A:3$

$0=2x^2+2x+1x+1$

$0=2x(x+1)+1(x+1)$

$0=(x+1)(2x+1)$

$x+1=0$

$x=-1$

$2x+1=0$

$2x=-1$

$x=-1/2$

(e) $x^2 - 2x - 1 = 0$

$M:-1$ } no # work
$A=-2$

$a=1 \quad b=-2 \quad c=-1$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-(-2)\pm\sqrt{(-2)^2-4(1)(-1)}}{2(1)}$

$x=\frac{2\pm\sqrt{8}}{2}$

$x=\frac{2\pm2\sqrt{2}}{2}$

$x=1\pm\sqrt{2}$