§3.1 Practice

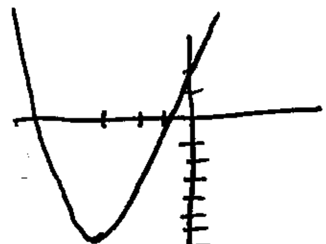
Write in the form $y=a(x-h)^2+k$. Sketch the graph. Do <u>not</u> find the x-intercepts.

① $y = x^2+6x+2$

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

$y=(x+3)^2-7$

Vertex $(-3,-7)$



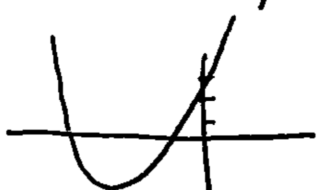
$(-3,-7)$

② $y = x^2+5x+3$

$y = \left(x^2+5x+\left(\frac{5}{2}\right)^2\right)-\left(\frac{5}{2}\right)^2+3$

$y = \left(x+\frac{5}{2}\right)^2-\frac{25}{4}+\frac{12}{4}$

$y = \left(x+\frac{5}{2}\right)^2-\frac{13}{4}$ vertex $\left(-\frac{5}{2},-\frac{13}{4}\right)$

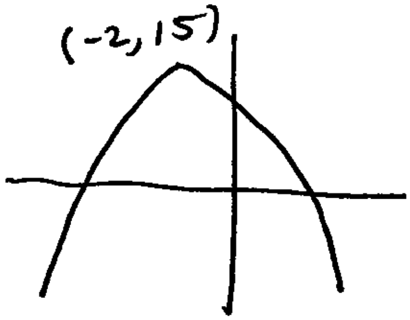


$\left(-\frac{5}{2},-\frac{13}{4}\right)$

③ $y = -2x^2 - 8x + 7$

$y = -2(x^2 + 4x + 4) + 8 + 7$

$y = -2(x+2)^2 + 15$ vertex $(-2, 15)$



write in the form $y = a(x-h)^2 + k$.
Find the vertex and sketch the graph.

④ $y = x^2 + 4x + 3$

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

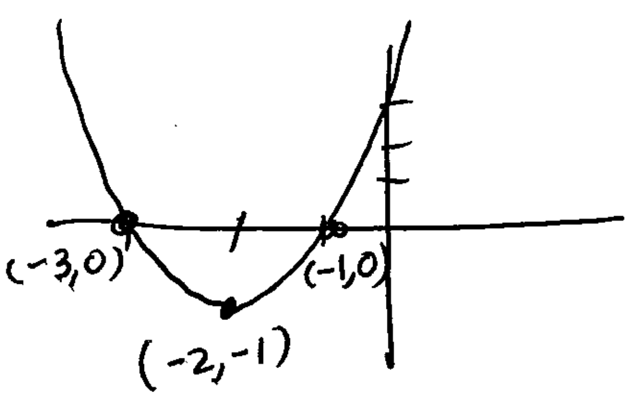
$y = (x+2)^2 - 1$ vertex $(-2, -1)$

<u>x-int</u>

$x^2 + 4x + 3 = 0$

$(x+3)(x+1) = 0,$

$x = -3, \ x = -1$



⑤ $y = x^2 - 2x - 8$

$y = (x^2 - 2x + 1) - 1 - 8$

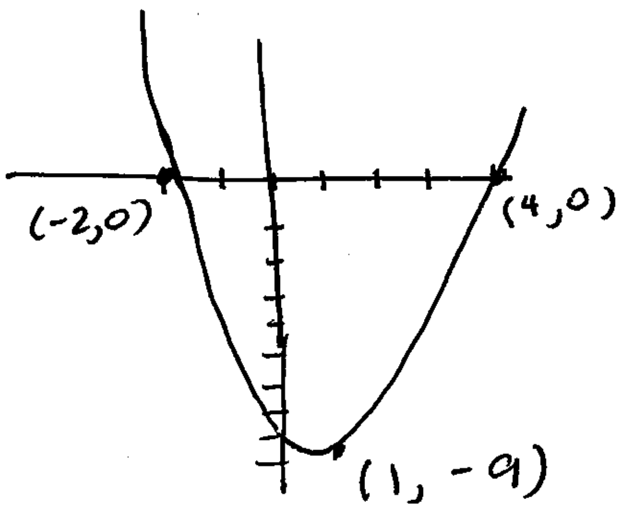
$y = (x-1)^2 - 9$ vertex ~~(1, 7)~~ $(1, -9)$

<u>x-int</u>

$x^2 - 2x - 8 = 0$

$(x-4)(x+2) = 0$

$x = 4, \quad x = -2$



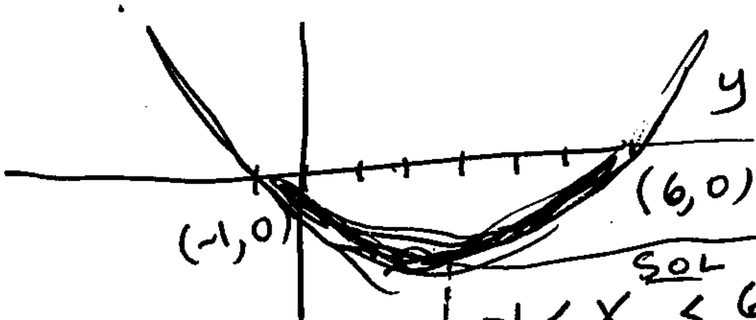
Solve the inequality.

(6) $x^2 - 5x - 6 < 0$

x-int. $x^2 - 5x - 6 = 0$

$(x-6)(x+1)$

$x = 6, \; x = -1$



Sol

$\boxed{-1 < x < 6}$

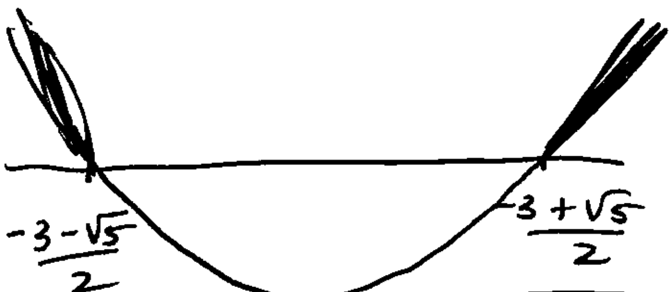
The interval $(-1, 6)$

(7) $x^2 + 3x + 1 > 0$

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

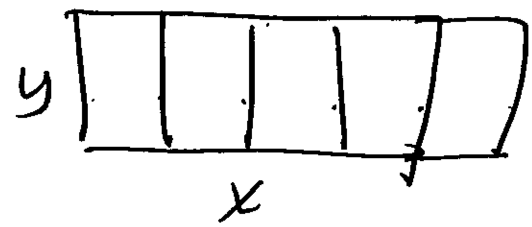
$$x = \frac{-3 \pm \sqrt{3^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$$

$$= \frac{-3 \pm \sqrt{9-4}}{2} = \frac{-3 \pm \sqrt{5}}{2}$$



$$\boxed{\left(-\infty, -\frac{3-\sqrt{5}}{2}\right) \cup \left(\frac{-3+\sqrt{5}}{2}, \infty\right)}$$

8 Mary Joe has 2400 ft of fencing to construct a rectangular pen with four interior walls parallel to one side. What overall dimensions will maximize area?



SOLUTION

FORMULAS

$A = xy$

$2x + 6y = 2400$

Eliminate variable.

$2x + 6y = 2400$

$2x = -6y + 2400$

$x = -3y + 1200$

$A = xy = (-3y + 1200)y$

$A = -3y^2 + 1200y$

Find vertex: $h = \frac{-b}{2a} = \frac{-1200}{2(-3)} = 200 \text{ ft}.$

$\boxed{y = 200 \text{ ft}}$

Find x

$2x + 6y = 2400$

$2x + 6(200) = 2400$

$2x + 1200 = 2400$

$2x = 1200$

$\boxed{x = 600 \text{ ft}}$