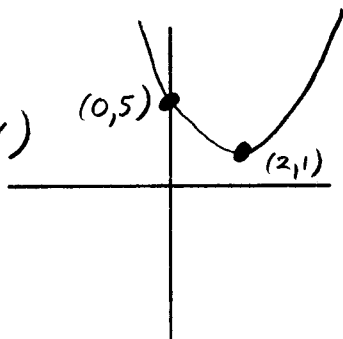


P-24 Rewrite each function by completing the square and then sketch each parabola showing the vertex, the y -intercept and any x -intercepts.

1. $y = x^2 - 4x + 5 = x^2 - 4x + 4 + 1$
 $= (x-2)^2 + 1$

(no x-intercepts!)



4. $y = 2x^2 - 4x - 16 = 2(x^2 - 2x) - 16$
 $= 2(x^2 - 2x + 1) - 2 - 16 = 2(x-1)^2 - 18$

$$0 = 2(x-1)^2 - 18$$

$$9 = (x-1)^2$$

$$x-1 = 3 \text{ so } x = 4$$

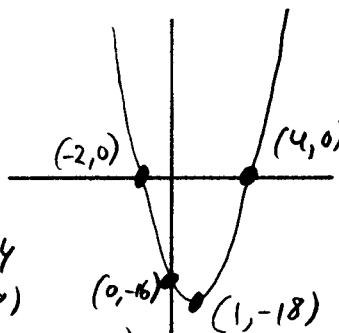
$$x-1 = -3 \text{ so } x = -2$$

x -intercepts

at $x = -2$ and 4

vertex is $(1, -18)$

y -intercept is $(0, -16)$



2. $y = x^2 - 2x - 3$
 $= x^2 - 2x + 1 - 4$
 $= (x-1)^2 - 4$

$$0 = (x-1)^2 - 4$$

$$4 = (x-1)^2$$

$$x-1 = \pm 2$$

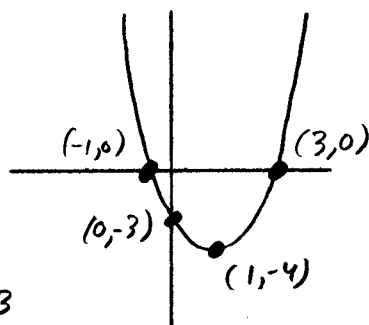
$$x-1 = 2 \text{ so } x = 3$$

$$x-1 = -2 \text{ so } x = -1$$

x -intercepts at $x = -1$ and 3

vertex is $(1, -4)$

y -intercept is $(0, -3)$



5. $y = -x^2 + 6x + 16 = -(x^2 - 6x) + 16$
 $= -(x^2 - 6x + 9) + 9 + 16 = -(x-3)^2 + 25$

$$0 = (x-3)^2 + 25$$

$$(x-3)^2 = -25$$

$$x-3 = 5 \text{ so } x = 8$$

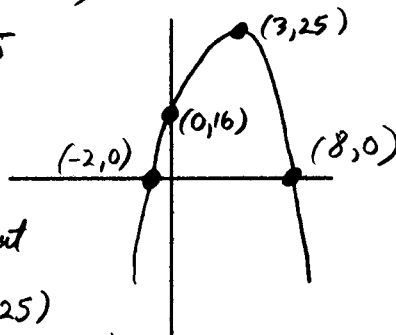
$$x-3 = -5 \text{ so } x = -2$$

x -intercepts at

$x = 8$ and -2

vertex is $(3, 25)$

y -intercept is $(0, 16)$

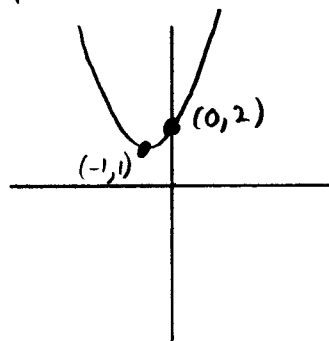


3. $y = x^2 + 2x + 2$
 $= x^2 + 2x + 1 + 1$
 $= (x+1)^2 + 1$

vertex is $(-1, 1)$

y -intercept is $(0, 2)$

no x-intercepts



6. $y = 3x^2 + 6x + 4 = 3(x^2 + 2x) + 4$
 $= 3(x^2 + 2x + 1) - 3 + 4 = 3(x+1)^2 + 1$

vertex is $(-1, 1)$

y -intercept is $(0, 4)$

no x-intercepts

