

General to Standard Form

Write each of the following in vertex form.

1) $f(x) = 2x^2 + 4x + 3$

$$f(x) = 2(x^2 + 2x + \underline{1}) + 3 - \underline{2}$$

$$f(x) = 2(x+1)^2 + 1$$

2) $f(x) = -2x^2 + 8x - 10$

$$= -2(x^2 - 4x + \underline{4}) - 10 + \underline{8}$$

$$f(x) = -2(x-2)^2 - 2$$

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

$$= -2(x^2 - 2x + \underline{1}) + 1 + \underline{2}$$

$$f(x) = -2(x-1)^2 + 3$$

4) $f(x) = 2x^2 - 16x + 28$

$$= 2(x^2 - 8x + \underline{16}) + 28 - 32$$

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

$$5) f(x) = 2x^2 - 8x + 4$$

$$= \underline{2}(x^2 - 4x + \underline{4}) + 4 - \underline{8}$$

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

$$6) f(x) = -2x^2 - 16x - 28$$

$$= \underline{-2}(x^2 + 8x + \underline{16}) - 28 + \underline{32}$$

$$f(x) = -2(x+4)^2 + 4$$

$$7) f(x) = x^2 - 6x + 5$$

$$= (x^2 - 6x + \underline{9}) + 5 - \underline{9}$$

$$f(x) = (x-3)^2 - 4$$

$$8) f(x) = x^2 + 4x + 5$$

$$= (x^2 + 4x + \underline{4}) + 5 - \underline{4}$$

$$f(x) = (x+2)^2 + 1$$

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

$$= \underline{-3}(x^2 - 2x + \underline{1}) + 3$$

$$f(x) = -3(x-1)^2 + 3$$

$$10) f(x) = -x^2 + 6x - 11$$

$$= \underline{-}(x^2 - 6x + \underline{9}) - 11 + 9$$

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

$$11) y = \frac{1}{3}x^2 - x + 4$$

$$= \frac{1}{3}\left(x^2 - 3x + \frac{9}{4}\right) + 4 - \frac{1}{3}\left(\frac{9}{4}\right)$$

$$f(x) = \frac{1}{3}\left(x - \frac{3}{2}\right)^2 - \frac{13}{4}$$

$$12) y = 2x^2 - 10x + 13$$

$$= 2\left(x^2 - 5x + \frac{25}{4}\right) + 13 - 2\left(\frac{25}{4}\right)$$

$$f(x) = 2\left(x - \frac{5}{2}\right)^2 + \frac{1}{2}$$

$$13) y = \frac{1}{2}x^2 - \frac{7}{2}x + \frac{17}{8}$$

$$= \frac{1}{2}\left(x^2 - 7x + \frac{49}{4}\right) + \frac{17}{8} - \frac{1}{2}\left(\frac{49}{4}\right)$$

$$f(x) = \frac{1}{2}\left(x - \frac{7}{2}\right)^2 - 4$$

$$14) y = -\frac{1}{2}x^2 - \frac{5}{2}x - 1$$

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

$$= -\frac{1}{2}\left(x + \frac{5}{2}\right)^2 - \frac{8}{8} + \frac{25}{8}$$

$$f(x) = -\frac{1}{2}\left(x + \frac{5}{2}\right)^2 + \frac{17}{8}$$

$$15) y = \frac{1}{2}x^2 + \frac{3}{2}x$$

$$= \frac{1}{2}\left(x^2 + 3x + \frac{9}{4}\right) - \frac{9}{8}$$

$$f(x) = \frac{1}{2}\left(x + \frac{3}{2}\right)^2 - \frac{9}{8}$$

$$16) y = 2x^2 - 2x - 2$$

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

$$f(x) = 2\left(x - \frac{1}{2}\right)^2 - \frac{5}{2}$$

$$17) y = x^2 - x + 3$$

$$= \left(x^2 - x + \frac{1}{4}\right) + 3 - \frac{1}{4}$$

$$f(x) = \left(x - \frac{1}{2}\right)^2 + \frac{11}{4}$$

$$18) y = \frac{1}{2}x^2 + \frac{9}{2}x + 6$$

$$= \frac{1}{2}\left(x^2 + 9x + \frac{81}{4}\right) + 6 - \frac{81}{8}$$

$$= \frac{1}{2}\left(x + \frac{9}{2}\right)^2 + \frac{48}{8} - \frac{81}{8}$$

$$f(x) = \frac{1}{2}\left(x + \frac{9}{2}\right)^2 - \frac{33}{8}$$

$$19) y = x^2 + 7x + \frac{57}{4}$$

$$= \left(x^2 + 7x + \frac{49}{4}\right) + \frac{57}{4} - \frac{49}{4}$$

$$f(x) = \left(x + \frac{7}{2}\right)^2 + 2$$

$$20) y = -\frac{1}{2}x^2 + \frac{3}{2}x - 5$$

$$= -\frac{1}{2}\left(x^2 - 3x + \frac{9}{4}\right) - 5 + \frac{1}{2}\left(\frac{9}{4}\right)$$

$$= -\frac{1}{2}\left(x - \frac{3}{2}\right)^2 - \frac{40}{8} + \frac{9}{8}$$

$$f(x) = -\frac{1}{2}\left(x - \frac{3}{2}\right)^2 - \frac{31}{8}$$