

# Pre-Calculus Math. 11

page 192 #2-4

2. a)

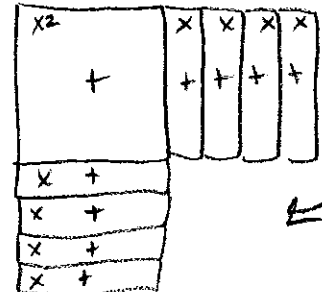
$$y = x^2 + 8x$$

$$y = (x^2 + 8x + 16) - 16$$

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

$$(x - \downarrow -4)$$

vertex  $(-4, -16)$



this must contain +16 but you need to also bring in -16

b)

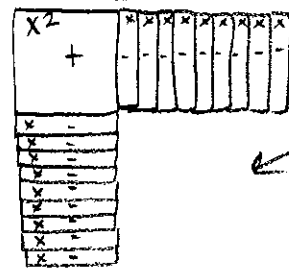
$$y = x^2 - 18x - 59$$

$$y = (x^2 - 18x + 81) - 81 - 59$$

$$y = (x^2 - 18x + 81) - 81 - 59$$

$$y = (x - 9)^2 - 140$$

vertex  $(9, -140)$



this must contain +81 (they are positive because neg \* neg = pos)

c)

$$y = x^2 - 10x + 31$$

$$y = (x^2 - 10x + 25) - 25 + 31$$

$$y = (x^2 - 10x + 25) - 25 + 31$$

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

vertex  $(5, 6)$

d)

$$y = x^2 + 32x - 120$$

$$y = (x^2 + 32x + 256) - 256 - 120$$

$$y = (x^2 + 32x + 256) - 256 - 120$$

$$y = (x + 16)^2 - 376$$

vertex  $(-16, -376)$

3. a)

$$y = 2x^2 - 12x$$

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

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

$$y = 2(x^2 - 6x + 9) - 18$$

$$y = 2(x - 3)^2 - 18$$

the  $2x^2$  means you will have 2 squares so you need to divide the x's into 2 groups too

each square will have an  $x^2$  and  $-6x$   
 the  $-9$  added for each is not needed for the square so put the  $2(-9) = -18$  aside

b)

$$y = 6x^2 + 24x + 17$$

$$y = 6(x^2 + 4x) + 17$$

$$y = 6(x^2 + 4x + 4 - 4) + 17$$

$$y = 6(x^2 + 4x + 4) - 24 + 17$$

$$y = 6(x + 2)^2 - 7$$

page 192 cont.

$$\begin{aligned} 3. \text{ c) } y &= 10x^2 - 160x + 80 \\ y &= 10(x^2 - 16x) + 80 \\ y &= 10(x^2 - 16x + 64 - 64) + 80 \\ y &= 10(x^2 - 16x + 64) - 640 + 80 \\ y &= 10(x - 8)^2 - 560 \end{aligned}$$

$$\begin{aligned} 4. \text{ a) } f(x) &= -4x^2 + 16x \\ f(x) &= -4(x^2 - 4x) \\ f(x) &= -4(x^2 - 4x + 4 - 4) \\ f(x) &= -4(x^2 - 4x + 4) + 16 \\ f(x) &= -4(x - 2)^2 + 16 \end{aligned}$$

$$\begin{aligned} \text{c) } f(x) &= -x^2 - 42x + 500 \\ f(x) &= -(x^2 + 42x) + 500 \\ f(x) &= -(x^2 + 42x + 441 - 441) + 500 \\ f(x) &= -(x^2 + 42x + 441) + 441 + 500 \\ f(x) &= -(x + 21)^2 + 941 \end{aligned}$$

$$\begin{aligned} \text{d) } y &= 3x^2 + 42x - 96 \\ y &= 3(x^2 + 14x) - 96 \\ y &= 3(x^2 + 14x + 49 - 49) - 96 \\ y &= 3(x^2 + 14x + 49) - 147 - 96 \\ y &= 3(x + 7)^2 - 243 \end{aligned}$$

$$\begin{aligned} \text{b) } f(x) &= -20x^2 - 400x - 243 \\ f(x) &= -20(x^2 + 20x) - 243 \\ f(x) &= -20(x^2 + 20x + 100 - 100) - 243 \\ f(x) &= -20(x^2 + 20x + 100) + 2000 - 243 \\ f(x) &= -20(x + 10)^2 - 1757 \end{aligned}$$

$$\begin{aligned} \text{d) } f(x) &= -7x^2 + 182x - 70 \\ f(x) &= -7(x^2 - 26x) - 70 \\ f(x) &= -7(x^2 - 26x + 169 - 169) - 70 \\ f(x) &= -7(x^2 - 26x + 169) + 1183 - 70 \\ f(x) &= -7(x - 13)^2 + 1113 \end{aligned}$$