Algebra 2

Handout 5.7 (day 3)

Writing a Quadratic Equation in Vertex form using Completing the Square

$$y = 3x^2 - 6x - 4$$

$+4$ $+4$

$\frac{y}{3} + \frac{4}{3} = \frac{3x^2}{3} - \frac{6x}{3}$ $\frac{1}{2}(2) = (1)^2$

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

$\frac{y}{3} + \frac{4}{3} + \frac{1(3)}{1(3)} = (x-1)(x-1)$

$\frac{y}{3} + \frac{7}{3} = (x-1)^2 - \frac{7}{3}$

$-7/3$

$3\left(\frac{y}{3}\right) = 3(x-1)^2 - \left(\frac{7}{3}\right)3$

$y = 3(x-1)^2 - 7$

$V(1,-7)$

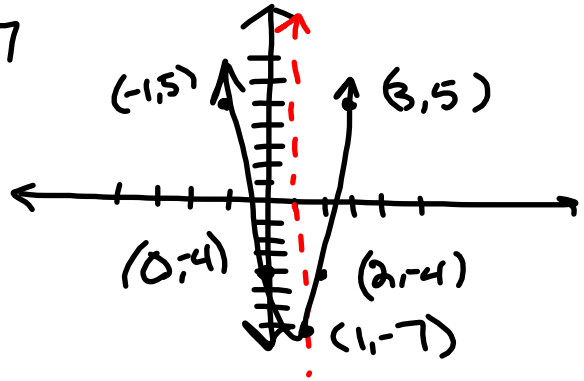
AOS: $x = 1$

D: $(-\infty, \infty)$

R: $[-7, \infty)$

Min at -7

x	y
0	-4
-1	5



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

$-\frac{1}{2}$ $-\frac{1}{2}$

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

$\frac{1}{2}(2) = (1)^2$

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

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

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

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

The monthly profit P from the sales of rugs woven by a family rug-making business depends on the price r that they charge for a rug. The profit is modeled by $P = -r^2 + 500r - 59,500$. Write the function in vertex form. What is the maximum monthly profit, in dollars, determined by this model? (r , P)
(price , Profit)

$P = -r^2 + 500r - 59,500$

$+59,500 \qquad +59,500$

$P + 59,500 = -r^2 + 500r$

$\frac{1}{2}(500) = (250)^2$

$-P - 59,500 + (250)^2 = r^2 - 500r + (250)^2$

$-P - 59,500 + 62,500 = (r-250)(r-250)$

$-P + 3000 = (r-250)^2$

$-3000 \qquad -3000$

$-P = (r-250)^2 - 3000$

$P = -(r-250)^2 + 3000$

$V(250, 3000)$

price of rug: $250
max. profit: $3000

12. Use the vertex form to find the vertex of $P = -\frac{1}{2}r^2 + 280r - 1200$. Does the vertex represent a maximum value or minimum value.