

p31 #5

#5. Rev = Unit price \times Quantity

$$\text{Rev} = (800 + 20x) \times (60 - x)$$

Let x represent \$20 increase in price.

\$1 decrease in tickets sold.

To get x intercepts

$$0 = (800 + 20x)(60 - x)$$

$$800 + 20x = 0 \quad \text{or} \quad 60 - x = 0$$

$$20x = -800$$

$$x = 60$$

$$x = \frac{-800}{20} = -40$$

$$\frac{60 - 40}{2} = \frac{20}{2} = 10 \quad (x \text{ coordinate of vertex})$$

Sub $x=10$ into the eq. ~~Re~~

$$\text{Rev} = (800 + 20 \cdot 10) \times (60 - 10)$$

$$= 1000 \times 50 = 50000$$

$$\text{Price} = 800 + 20(10) = \$1000$$

$$\text{Profit} = \text{Unit profit} \times \text{Quantity}$$

(Price - cost)

$$Y = (30 - 1.5x) \times (60 + 10x)$$

$$0 = (30 - 1.5x)(60 + 10x)$$

$$Y=0 \text{ if } 30 - 1.5x = 0 \text{ or } 60 + 10x = 0$$

$$-1.5x = -30$$

$$x = \frac{-30}{-1.5} = 20$$

$$10x = 10 - 60$$

$$10x = -50$$

$$x = \frac{-50}{10} = -5$$

$$x \text{ coordinate of vertex} = \frac{20 - (-5)}{2} = \frac{15}{2} = 7.5$$

$$\begin{aligned} \text{When } x = 7.5 \rightarrow Y &= (30 - 1.5(7.5)) \times (60 + 10(7.5)) \\ &= 18.75 \times 135 = 2531.25 \end{aligned}$$

$$\therefore \# \text{ of people} = 60 + 10(7.5) = 135 \text{ people.}$$