

You are having a charity event in a venue with a capacity of 1,200, and are confident you can sell it out at a ticket price of \$5. You are considering increasing the ticket price to raise more money. Common sense says that if you charge too much, no one will come, and past experience suggests that for every \$0.5 increase in the ticket price 75 fewer tickets will be sold. What ticket price will raise the most money? *Optimization.*

$$\$5 \times 1,200 = \$6,000 \quad -$$

$$\$5.50 \times (1,200 - 75) = \$6,187.50 \quad -$$

$$\$7.00 \times (1,200 - \left(\frac{7-5}{0.5}\right) 75) = \$6,300 \quad -$$

$$\textcircled{\$20} \times (1,200 - \left(\frac{20-5}{0.5}\right) 75) = -ve$$

$x \quad \times \quad \# \text{ tickets} \quad = \text{total} = y$

$x = \text{ticket price}$

$$x \left(1200 - \underbrace{\left(\frac{x-5}{0.5} \right) 75}_{\# \text{ tickets}} \right) = y$$

$$x(1200 - (150x - 750)) = y$$

$$\cancel{1200x} - 150x^2 + \cancel{750x} = y$$

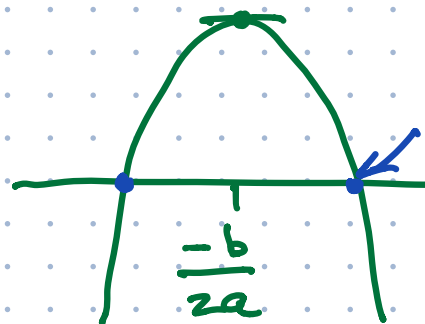
$$y = 1950x - 150x^2$$

$$= \underbrace{-150x^2}_a + \underbrace{1950x}_b + \underbrace{0}_c$$

$$x = \frac{-b}{2a} = \frac{-1950}{2(-150)}$$

$= \$6.50$ ticket to maximize revenue

$$y = 1950(6.5) - 150(6.5)^2 = 6,337.5$$



$$y = 1950x - 150x^2 \stackrel{!}{=} 0$$

$$x \times (1950 - 150x) = 0$$

$$x = 0$$

$$1950 - 150x = 0$$

$$x = \frac{1950}{150} = \$13$$