15. Revenue = Price * Quantity

\[ R(x) = (24 - x)(1000 + 100x) \]
\[ = 24,000 + 1400x - 100x^2 \]

Let \( x \) = # of $1.00 price reductions

Domain: \(-10 \leq x \leq 24\) or \(-10 < x < 24\)

Range on relevant domain: \(0 \leq R(x) \leq 0\)

Max on graph: \((7, 28,900)\)

Price of $17.00 will maximize revenue

Max Revenue: $28,900

16. Max quantity: 200 passengers

Min. "\#": 150

\[ x = \# \text{ of } \$2.00 \text{ price decrease} \]

\[ R(x) = (540 - 2x)(150 + x) = 81,000 + 240x - 2x^2 \]

Domain: \(150 \leq x \leq 50\) (150-200 passengers)

Max on graph: \((60, 88,200)\)

50 is \(x\) value for max. rev.

Price of $440.00 will max revenue of $88,000.00

Range on relevant domain: \(81,000 \leq R(x) \leq 88,000\)
5. Barber’s Shop can average at most 9 haircuts per hour for the 8 hours it is open. At $20.00 per haircut, Barber’s Shop gets 50 customers per day on average. For every $2.00 increase in the price of a haircut, the Shop loses 11 customers per day on average. For every $2.00 decrease in the price of a haircut, the Shop gains 11 more customers per day. (7 points)

(b) Write a function to model (represent) the daily revenue (R) the Shop receives.

Let $x =$ # of $2.00 price increases. 

$$ R = \frac{(20 + 2x)(50 - 11x)}{1000 - 120x - 22x^2} $$

(b) What is the domain of $x$? 

$$ -2 \leq x \leq 4 \frac{6}{11} \leq 4.54 $$

(c) What price should Mike charge in order to maximize revenue? 

$$ \max \text{ on graph } @ -2.72, 1163.636, \text{ but this is outside domain} $$

(d) How many customers will get haircuts on an average day at that rate? 

$$ 72 \frac{50 - 11(-2)}{4} $$

(e) How much income will be realized at that price? (i.e. What is the maximum income?) 

$$ 115.2 $$

Your plot should be “off” for Problems # 2 – 3.

max: 96 haircuts

2. Ludwig’s Hair Salon can average 12 haircuts per hour for the 8 hours it is open. At $15.00 per haircut, Ludwig’s Hair salon gets 75 customers per day on average. For every $3.00 decrease in the price of a haircut, the Salon gains 5 more customers per day. For every $3.00 increase in the price of a haircut, the Shop loses 5 more customers per day. (7 points)

(a) Write a function to model (represent) the daily revenue (R) the Salon receives.

Let $x =$ # of $3.00 price decreases. 

$$ R(x) = \frac{(15 - 3x)(75 + 5x)}{125 - 150x - 15x^2} $$

(b) What is the domain of $x$? 

$$ -1.5 \leq x \leq 4.2 $$

(c) What price should Lindsey charge in order to maximize revenue? 

$$ \max @ -5, 1500 $$

(d) How many customers will get haircuts on an average day at that rate? 

$$ 50 $$

(e) How much income will be realized at that price? (i.e. What is the maximum income?) 

$$ 1500 $$