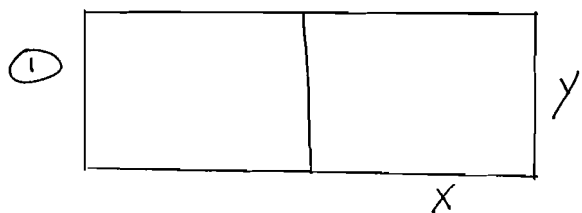


cal I
optimization Review
answers



Restrictions:

$$4X + 3Y = 400$$

$$\begin{array}{r} 4X + 3Y = 400 \\ -3Y \quad -3Y \\ \hline 4X = -3Y + 400 \\ \frac{4X}{4} = \frac{-3Y + 400}{4} \end{array}$$

$$X = -\frac{3}{4}Y + 100$$

$$X = -\frac{3}{4}(66.67) + 100$$

$$X = 150$$

Primary:

$$A = XY$$

$$A = \left(-\frac{3}{4}Y + 100\right)Y$$

$$A = -\frac{3}{4}Y^2 + 100Y$$

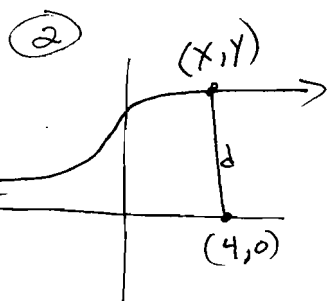
$$A' = -\frac{3}{2}Y + 100 = 0$$

$$\frac{3}{2}Y = 100$$

$$Y = 66.67$$

$$A' \quad \frac{+}{-} \quad \frac{-}{66.67}$$

150 x 66.67 ft



Primary:

$$d = \sqrt{(X-4)^2 + Y^2}$$

$$d = \sqrt{(X-4)^2 + (3 + X^{\frac{1}{3}})^2}$$

$$d = \sqrt{X^2 - 8X + 16 + 9 + 6X^{\frac{1}{3}} + X^{\frac{2}{3}}}$$

$$L = X^2 - 8X + X^{\frac{2}{3}} + 6X^{\frac{1}{3}} + 25$$

$$L' = 2X - 8 + \frac{2}{3}X^{-\frac{1}{3}} + 2X^{-\frac{2}{3}} = 0$$

Restriction
 $Y = 3 + X^{\frac{1}{3}}$

$$Y = 3 + (3.33)^{\frac{1}{3}}$$

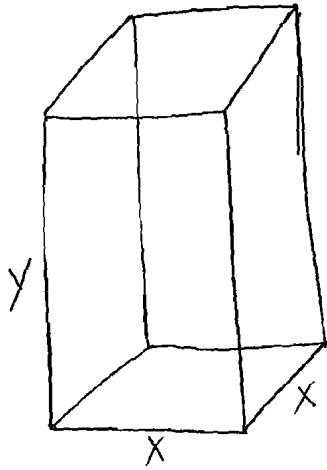
$$Y = 4.49$$

$$X = 3.33$$

$$\frac{-}{+} \quad \frac{+}{3.33}$$

(3.33, 4.49)

③



Primary:

$$C = 15x^2 + 5x^2 + 8(4xy)$$

$$C = 20x^2 + 32xy$$

$$C = 20x^2 + 32x \left(\frac{23}{x^2} \right)$$

$$C = 20x^2 + 736x^{-1}$$

$$C' = 40x - \frac{736}{x^2} = 0$$

Restrictions:

$$x^2 y = 23$$

$$y = \frac{23}{x^2}$$

$$y = \frac{23}{(2.64)^2} = 3.3$$

$$\frac{736}{x^2} = 40x$$

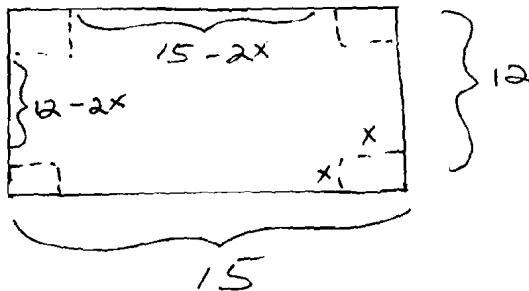
$$736 = 40x^3$$

$$x = 2.64$$

$$C' \begin{array}{c} - \quad + \\ | \quad | \\ \hline 2.64 \end{array}$$

$2.64 \times 2.64 \times 3.3$

④



Primary

$$V = L \cdot w \cdot h$$

$$V = (15-2x)(12-2x)x$$

$$V = 180x - 54x^2 + 4x^3$$

$$V' = 180 - 108x + 12x^2 = 0$$

$$x = 2.21, \quad \text{6.79 not in domain}$$

$$V' \begin{array}{c} + \quad - \\ | \quad | \\ \hline 2.21 \end{array}$$

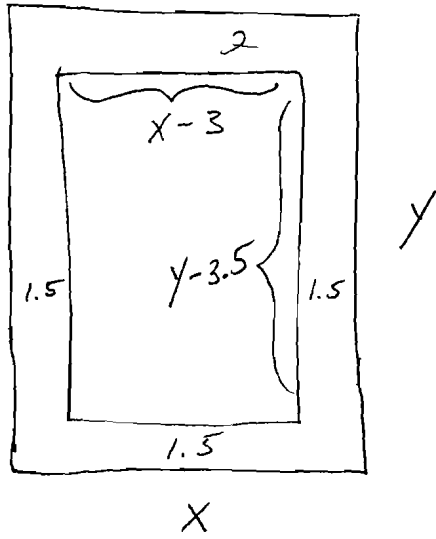
$$L = 15 - 2x$$

$$w = 12 - 2x$$

$$h = x$$

$$\begin{aligned} L &= 15 - 2(2.21) \\ &= 10.58 \\ w &= 12 - 2(2.21) \\ &= 7.58 \\ h &= 2.21 \end{aligned}$$

5



$$A = (x-3)(y-3.5)$$

$$A = (x-3)\left(\frac{300}{x} - 3.5\right)$$

$$A = 300 - 3.5x - \frac{900}{x} + 10.5$$

$$A' = -3.5 + \frac{900}{x^2} = 0$$

Restriction:

$$xy = 300$$

$$y = \frac{300}{x}$$

$$y = \frac{300}{16.04} = 18.7$$

$$\frac{900}{x^2} = +3.5$$

$$900 = +3.5x^2$$

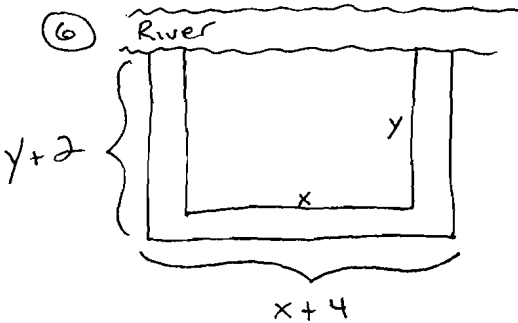
$$x^2 = 257.14$$

$$x = 16.04$$

$$A' \frac{+}{-} \frac{-}{16.04}$$

18.7 x 16.04

6



Primary:

$$A = (x+4)(y+2) - xy$$

$$A = (x+4)\left(\frac{800}{x} + 2\right) - 800$$

$$A = 800 + 2x + 3200x^{-1} + 8 - 800$$

Restriction:

$$xy = 800$$

$$y = \frac{800}{x}$$

$$y = \frac{800}{40} = 20$$

$$A' = 2 - \frac{3200}{x^2} = 0$$

$$\frac{3200}{x^2} = 2$$

$$2x^2 = 3200$$

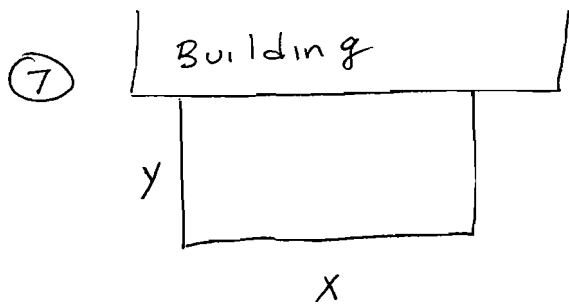
$$x = 40$$

$$A' \frac{-}{+} \frac{+}{40}$$

outside dimensions:

$$\begin{array}{ccc} y+2 & x & x+4 \\ 20+2 & x & 40+4 \end{array}$$

22 x 44



Restrictions:

$$35x + 28(2y) = 980$$

$$35x + 56y = 980$$

$$\quad -56y \quad -56y$$

$$\frac{35}{35}x = \frac{-56y + 980}{35}$$

$$x = -\frac{8}{5}y + 28$$

$$x = -\frac{8}{5}(8.75) + 28$$

$$x = 14$$

Primary:

$$A = x y$$

$$A = \left(-\frac{8}{5}y + 28\right) y$$

$$A = -\frac{8}{5}y^2 + 28y$$

$$A' = -\frac{16}{5}y + 28 = 0$$

$$\frac{16}{5}y = 28$$

$$y = 8.75$$

$$A' \quad \begin{array}{c} + \quad | \quad - \\ \hline 8.75 \end{array}$$

$$8.75 \times 14 \text{ ft}$$