

1) Primary: $S = x + y$

Constraint: $xy = 192$

$$y = \frac{192}{x}$$

$$S = x + \frac{192}{x}$$

$$S = x + 192x^{-1}$$

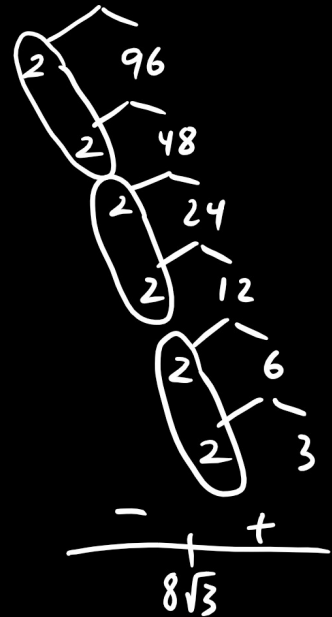
$$S' = 1 - 192x^{-2} = 0$$

$$x^2 \left(1 - \frac{192}{x^2} \right) = 0$$

$$x^2 - 192 = 0$$

$$x^2 = 192$$

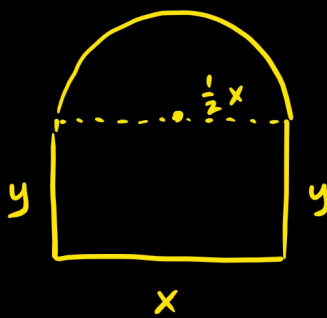
$$x = \sqrt{192} = 8\sqrt{3}$$



$$y = \frac{192}{8\sqrt{3}} = 8\sqrt{3}$$

$8\sqrt{3}$ and $8\sqrt{3}$

5)



$$A = xy + \frac{\pi(\frac{1}{2}x)^2}{2} = xy + \frac{\pi \cdot \frac{1}{4}x^2}{2} = xy + \frac{\pi x^2}{8}$$

$$P = x + 2y + \frac{\pi(\frac{1}{2}x)}{2} = x + 2y + \frac{1}{2}\pi x = 16$$

$$2y = 16 - x - \frac{1}{2}\pi x$$

$$y = 8 - \frac{1}{2}x - \frac{1}{4}\pi x$$

$$A = x(8 - \frac{1}{2}x - \frac{1}{4}\pi x) + \frac{\pi x^2}{8}$$

$$A = 8x - \frac{1}{2}x^2 - \frac{1}{4}\pi x^2 + \frac{1}{8}\pi x^2 = 8x - \frac{1}{2}x^2 - \frac{1}{8}\pi x^2$$

$$A' = 8 - x - \frac{1}{4}\pi x = 0$$

$$32 - 4x - \pi x = 0$$

$$32 = 4x + \pi x$$

$$32 = x(4 + \pi)$$

$$\frac{32}{4 + \pi} = x$$

$$x \approx 4.48$$

$$\frac{+}{-} \quad 4.48$$

$$y = 8 - \frac{1}{2}(4.48) - \frac{1}{4}\pi(4.48)$$

$$y = 2.24$$

$x = 4.48$ $y = 2.24$

