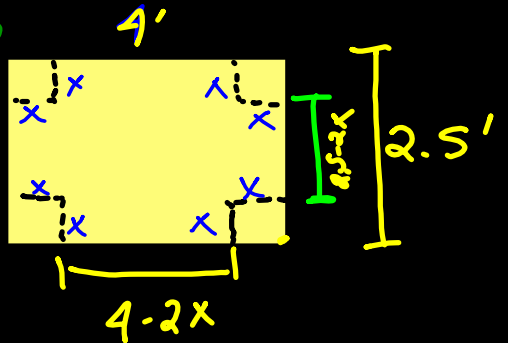
VOLUME

6.



$V = lwh$

$V = (4-2x)(2.5-2x)x$

$V = (10 - 8x - 5x + 4x^2)x$

$V = 4x^3 - 13x^2 + 10x$

$V' = 12x^2 - 26x + 10 = 0$

$2(6x^2 - 13x + 5) = 0$

$2(3x-5)(2x-1) = 0$

~~$x = 5/3$~~ $x = 1/2$

(0, 1.25)

(0, 1.25)

$\lim_{x \to 0} 4x^3 - 13x^2 + 10x = 0$

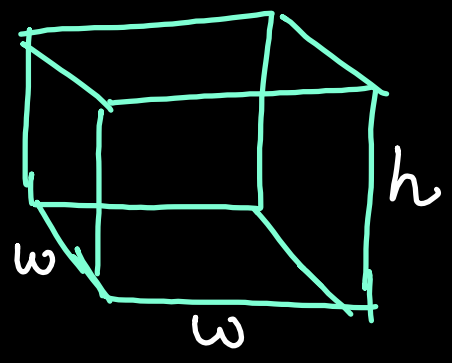
$\lim_{x \to 1.25} 4x^3 - 13x^2 + 10x = 0$

$V(1/2) = 2.25$

$1/2 \mid 2.25$

Cut squares of $1/2$ ft. (6 in.)

1



Cost = 756
bottom = $5/ft^2$
top = $2/ft^2$
sides = $3/ft^2$
Maximize Volume.

$V = w^2 h$

$5w^2 + 2w^2 + 3 \cdot 4wh = 756$
bottom top sides

$\Leftrightarrow 7w^2 + 12wh = 756$

$\frac{12wh}{12w} = \frac{756 - 7w^2}{12w}$

$V = w^2\left(\frac{756 - 7w^2}{12w}\right)$

$V = \frac{756w}{12} - \frac{7w^3}{12}$

$* \; V = 63w - \frac{7}{12}w^3$

Crit. pts.

$V' = 63 - \frac{7}{4}w^2 = 0$

$\frac{4}{7} \cdot 63 = \frac{7}{4}w^2$

$\sqrt{36} = \sqrt{w^2}$

$\pm 6 = w$

$w: (0, \sqrt{108})$
10.4

$7w^2 = 756$
$\sqrt{w^2} = \sqrt{108}$

$\lim_{w \to 0} 63w - \frac{7}{12}w^3 = 0$

$\lim_{w \to \sqrt{108}} 63w - \frac{7}{12}w^2 = 0$

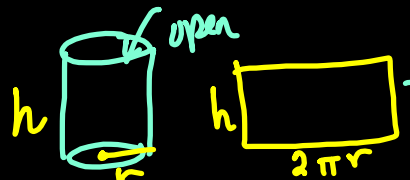
$V(6) = 252$

6 | 252

$h = \frac{756 - 7w^2}{12w}$

$h = 7$

Dimensions, 6' x 6' x 7'



$V = 16\pi \text{ in}^3$

Bottom costs twice as much as sides

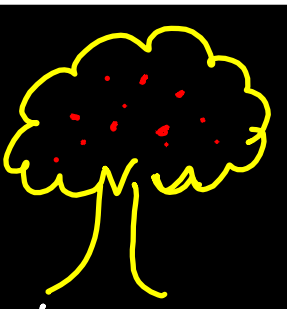
Minimize Cost

$C = 2 \cdot \text{bottom} + \text{sides}$

$C = 2\pi r^2 + 2\pi rh$

$16\pi = \pi r^2 h$

9 24 trees/acre — 600 apples/tree



↑ tree ↓ 12 apples per tree

x = # of trees added Maximize Apple production

$[0, 50]$

$A = 24 * 600$

$A = (\#\text{ of trees} + x)(\text{apples/tree} - 12x)$

$A = (24 + x)(600 - 12x)$

$600 - 12x = 0$

$600 = 12x$

$50 = x$

January 7, 2022