

4.4 Day 1

$V = lwh$

$V = (8.5 - 2x)(11 - 2x)(x)$

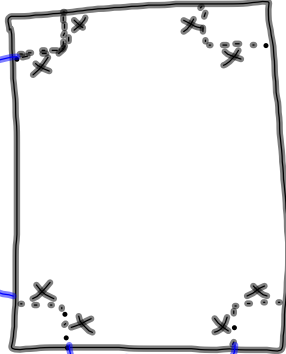
$= x(93.5 - 39x + 4x^2)$

$= 93.5x - 39x^2 + 4x^3$

$V' = 93.5 - 78x + 12x^2 = 0$

$x = \frac{78 \pm \sqrt{(-78)^2 - 4(12)(93.5)}}{24} \approx \cancel{4.915}, 1.585$

$x \approx 1.585 \text{ in}$



+ | - | +  
1.585 | 4.915

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1. area of bottom  
area of 4 sides

$S = x^2 + 4xh$

$= x^2 + 4x\left(\frac{108}{x^2}\right)$

$S = x^2 + \frac{432}{x}$

$S' = \frac{2x^3}{x^2} - \frac{432}{x^2} = 0$

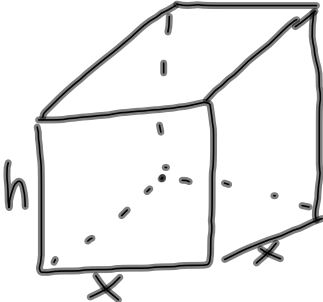
$\frac{2x^3 - 432}{x^2} = 0$

$2x^3 - 432 = 0$

$x^3 = 216$

$x = 6$

6 in x 6 in x 3 in



$V = 108 = \frac{x^2 h}{x^2}$

$h = \frac{108}{x^2} = \frac{108}{36}$

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2.

$A = bh$   
 $b = 2x \quad h = -x^2 + 9$   
 $A = 2x(-x^2 + 9)$   
 $= -2x^3 + 18x$

$A' = -6x^2 + 18 = 0$   
 $\frac{-18}{-6} \quad \frac{-18}{-6}$   
 $x^2 = 3$   
 $x = \pm\sqrt{3}$   
 max @  $x = \sqrt{3}$

$y = -x^2 + 9$

$(x, -x^2 + 9)$

$2x$

$x$

$-\quad | \quad + \quad | \quad -$   
 $-\sqrt{3} \quad \sqrt{3}$

$A = -2(\sqrt{3})^3 + 18\sqrt{3}$   
 $-2(3\sqrt{3}) + 18\sqrt{3}$   
 $-6\sqrt{3} + 18\sqrt{3}$   
 $12\sqrt{3} \text{ units}^2$

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3.

$A = bh$   
 $b = \pi - 2x \quad h = \sin x$   
 $A = (\pi - 2x) \cdot \sin x$

$A' = (\pi - 2x) \cos x + \sin x (-2)$   
 $= \pi \cos x - 2x \cos x - 2 \sin x = 0$   
 on calc:  $x \approx .710, 2.431$

$A = (\pi - 2 \cdot .710) \sin(.710) \approx 1.122 \text{ u}^2$

$y = \sin x$

$(x, \sin x)$

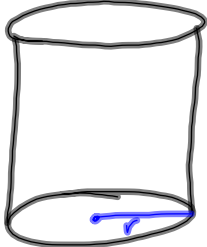
$x$

$\pi - 2x > 0$

$\pi$

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4. area of top & bottom area of side



$$S = 2\pi r^2 + 2\pi r h$$

$$S = 2\pi r^2 + 2\pi r \left( \frac{2000}{\pi r^2} \right)$$

$$S = 2\pi r^2 + \frac{4000}{r}$$

$$S' = \frac{4\pi r^3 - 4000}{r^2} = 0$$

$$4\pi r^3 - 4000 = 0$$

$$r^3 = \frac{1000}{\pi}$$

$$r = \sqrt[3]{\frac{1000}{\pi}} = \frac{10}{\sqrt[3]{\pi}} \text{ cm}$$

$$h = \frac{2000}{\pi \left( \frac{10}{\sqrt[3]{\pi}} \right)^2} \text{ cm}$$

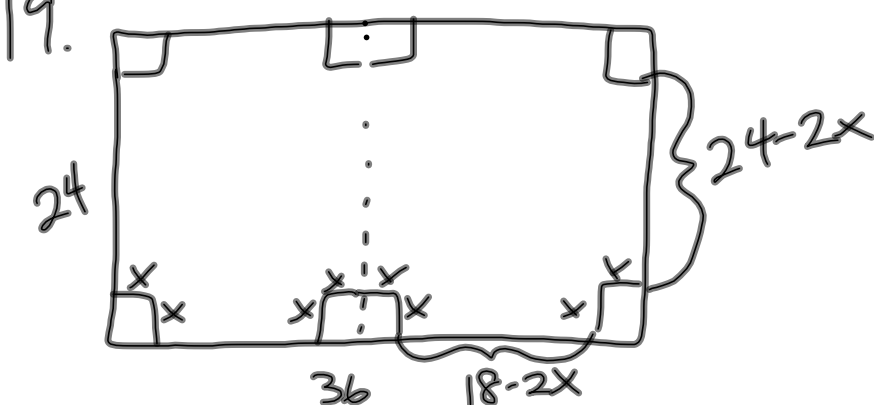
$V = 2L = 2000 \text{ cm}^3$

$$\frac{\pi r^2 h}{\pi r^2} = \frac{2000}{\pi r^2}$$

$$h = \frac{2000}{\pi r^2}$$

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19.



a.  $V = (18-2x)(24-2x)(2x)$

b.  $x > 0$      $18-2x > 0$      $24-2x > 0$   
 $x < 9$                        $x < 12$   
 $D: [0, 9]$

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