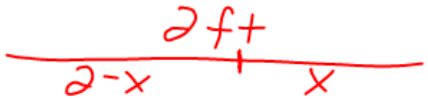
$P = 96$ ft

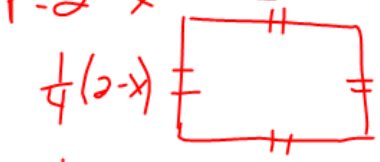
---

(32)



$P = x$ ft

$[0, 2]$

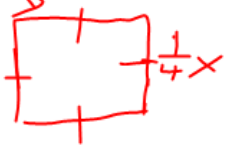


$P = 2 - x$

$\frac{1}{4}(2-x)$

$\frac{1}{2} - \frac{1}{4}x$

$A = \left(\frac{1}{2} - \frac{1}{4}x\right)^2$



$A = \left(\frac{1}{4}x\right)^2$

$A(1) = \frac{1}{8}$

$A(0) = \frac{1}{4}$

$A(2) = \frac{1}{4}$

Total Area $= A(x) = \left(\frac{1}{2} - \frac{1}{4}x\right)^2 + \frac{1}{16}x^2$

$A'(x) = -\frac{1}{2}\cancel{2}\left(\frac{1}{2} - \frac{1}{4}x\right)\left(-\frac{1}{4}\right) + \frac{1}{8}x$

$= -\frac{1}{4} + \frac{1}{8}x + \frac{1}{8}x$

$A'(x) = \frac{1}{4}x - \frac{1}{4}$

$\frac{1}{4}x - \frac{1}{4} = 0$

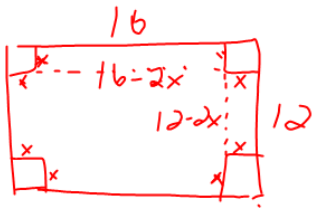
$x = 1$

$A'(x)$ $\quad - \quad 0 \quad +$

$\searrow \quad 1 \quad \nearrow$

min

16



$V = lwh$

$V(x) = (16-2x)(12-2x)(x)$

$V(x) = 192x - 56x^2 + 4x^3$

$V'(x) = 12x^2 - 112x + 192$

$0 = 4(3x^2 - 28x + 48)$

$x = \frac{28 \pm \sqrt{(-28)^2 - 4(3)(48)}}{2(3)}$

$x \approx 2.26, 7.07$

$[0, 6]$

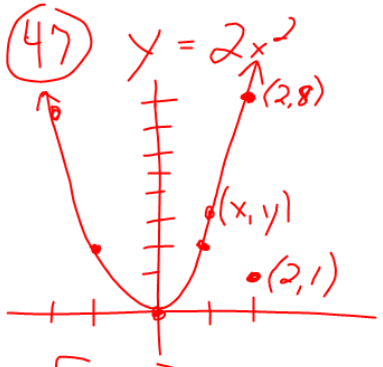
$V(0) = 0$

$V(6) = 0$

$V(2.26) = 194.07$

2.26

47



$[0, 2]$

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$d = \sqrt{(x-2)^2 + (y-1)^2}$

$d(x) = \sqrt{(x-2)^2 + (2x^2-1)^2}$

$f(x) = [d(x)]^2 = (x-2)^2 + (2x^2-1)^2$

$f'(x) = 2(x-2) + 8x(2x^2-1)(4x)$

$= 2x - 4 + 16x^3 - 8x$

$f'(x) = 16x^3 - 6x - 4$

$16x^3 - 6x - 4 = 0$

crit #'s

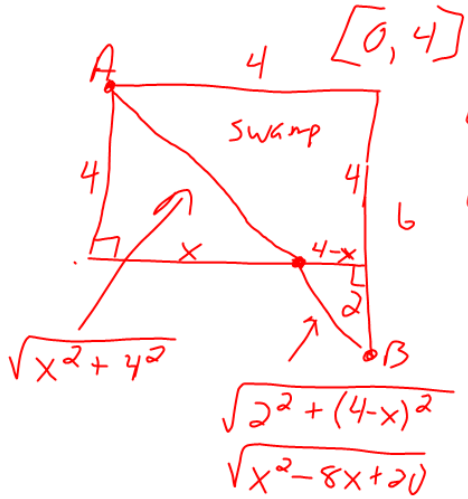
$x = .8237$

$f(0) = 5$

$f(2) = 49$

$f(.8237) = 1.51$ min

(.8237, 1.357)



[0, 4]

$C(x) = 6(x^2+16)^{1/2} + 2(x^2-8x+20)^{1/2}$

$C'(x) = 3(x^2+16)^{-1/2}(2x) + (x^2-8x+20)^{-1/2}(2x-8)$

or

$C'(x) = \frac{6x}{\sqrt{x^2+16}} + \frac{2x-8}{\sqrt{x^2-8x+20}}$

Cr, + #

$x \approx 1.136$

$C(0) =$

$C(4) =$

$C(1.136) =$

51

$V = 16$ fl. oz.

1 fl oz. $= 1.80469\ in^3$

$\times 16$

$V = 28.87504\ in^3$

$28.87504 = \pi r^2 h$

$h = \frac{28.87504}{\pi r^2}$

$r = 1.6626$ in

$h =$

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

$A(r) = 2\pi r^2 + 2\pi r\left(\frac{28.87504}{\pi r^2}\right)$

$A(r) = 2\pi r^2 + 57.75008 r^{-1}$

$A'(r) = \frac{4\pi r^3}{r^2} - 57.75008 r^{-2}$

$A'(r) = \frac{4\pi r^3 - 57.75008}{r^2}$

$4\pi r^3 - 57.75008 = 0$

$r = \sqrt[3]{\frac{57.75008}{4\pi}}$

$r \approx 1.6626$ in