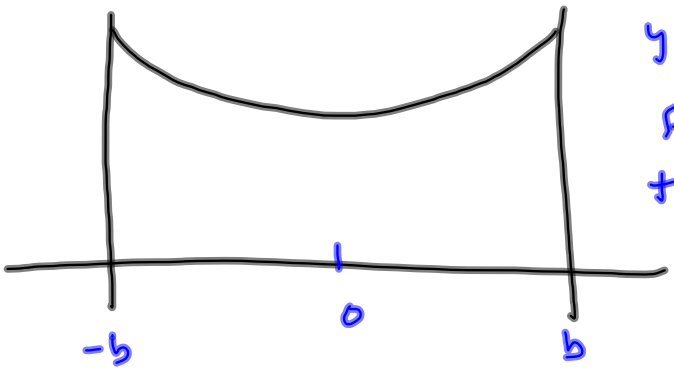
S'9.1 #40



$y = c + a\cosh\left(\frac{x}{a}\right)$

Find length of the wire.

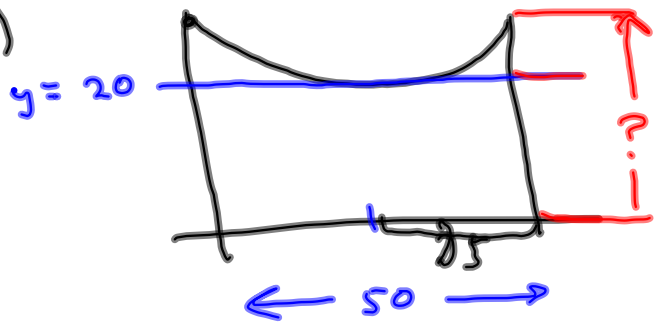
$y' = \sinh(x/a)$

$$\int_a^b ds = 2\int_0^b \underbrace{\sqrt{1+(y')^2}\,dx}_{ds} = 2\int_0^b \sqrt{1+\sinh^2(x/a)}\,dx$$

$$= 2a\sinh\left(\frac{x}{a}\right)\Big]_0^b$$

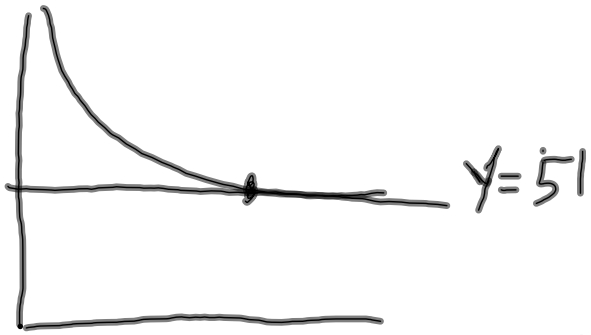
$$= 2a\sinh\left(\frac{b}{a}\right) =$$

(b)



$S = 51$ ft

$2a\sinh\left(\frac{25}{a}\right)=51$



$a\approx 72.3843$

$y=c+a\cosh\left(\frac{x}{a}\right)$

$y=c+72.3843\cosh\left(\frac{x}{72.3843}\right)$

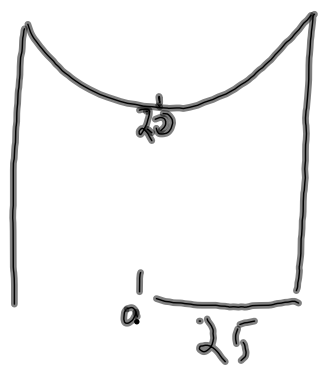
$20=c+72.3843\cosh\left(\frac{x}{72.3843}\right)$

$\cosh(0)=1$

$20=c+72.3843$

$c\approx -52.3843$

$y=72.3843\cosh\left(\frac{x}{72.3843}\right)-52.3843$



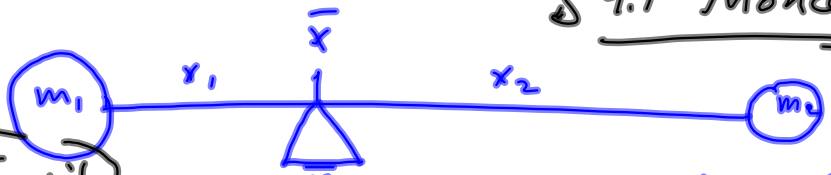
Oct 7-12:46 PM

Centroids / Center of Mass

Moments

2nd Piece of §9.3

§9.1 Monday



Fulcrum at the center of mass.

Extra Credit
24, 28, 31
§9.3

$m_1 x_1 = m_2 x_2$

$\vdots$

$$\bar{x} = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$$

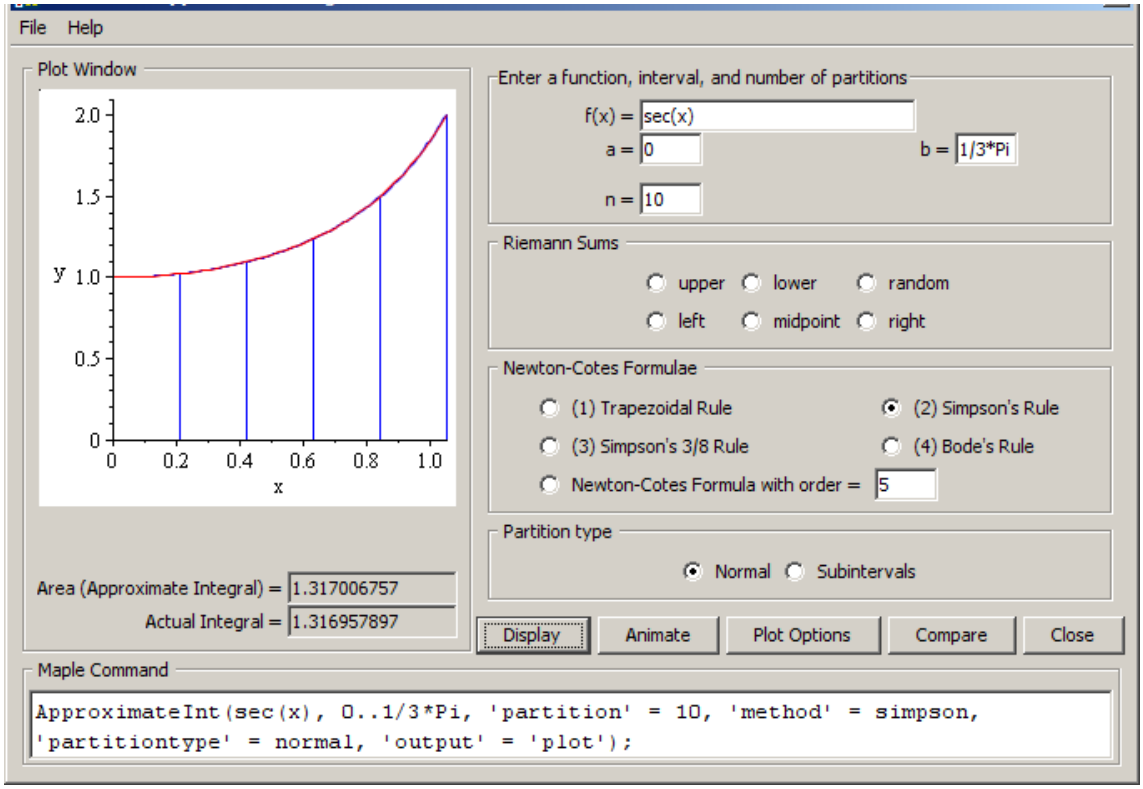
$$= \frac{\sum m_k x_k}{\sum m_k}$$

$$\longrightarrow \frac{\int f(x)\, x\, dx}{\int f(x)}$$

x	frequency
1	5
2	7
3	8

1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 3

$$\bar{x} = \frac{\sum fx}{\sum f}$$



1.317006757

1.316957897

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