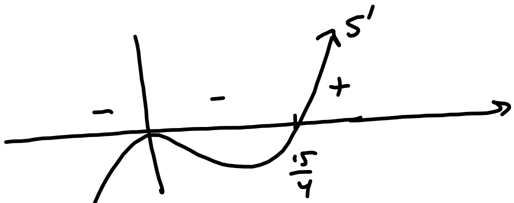
$f'(t) = .04t^3 - .15t^2 \overset{\text{set}}{=} 0 \Longrightarrow$

$t = 0,\ \frac{15}{4} = 3.75$

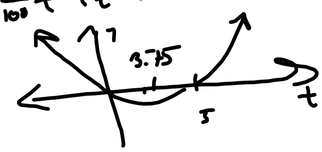
$t^2(.04t - .15)$



$s(t) = .01t^4 - .05t^3$

$= t^3(.01t - .05)$

$= \frac{1}{100}t^3(t-5)$



so, $\left|s(\tfrac{15}{4}) - s(0)\right| + \left|s(9) - s(\tfrac{15}{4})\right|$

$= -s(\tfrac{15}{4}) + s(9) - s(\tfrac{15}{4})$

$= -s(\tfrac{15}{4}) + s(9) + \left|s(\tfrac{15}{4})\right| \approx$ 30.47835938

$= -2s(\tfrac{15}{4}) + s(9) \approx$ 30.47835938

No idea why I'm using "s" instead of "f."

2.7 #1 TOTAL DISTANCE **My Notes Sucked. Phoenix doesn't!**

$f(t) = .01t^4 - .06t^3$ position for $t \geq 0$

Find $\boxed{\text{Total}}$ DISTANCE traveled in 12 sec.

$t \in [0, 12]$ → NOT <u>NET</u>.

Net distance would just be $f(12) - f(0)$

TOTAL DISTANCE IS more of an $|f(t)|$

Method: Find which direction it's going!

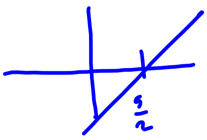
Add up the distances one direction at a time.

$$v(t) = \text{velocity} = f'(t) = 4(.01t^3) - 3(.06t^2)$$

$$= .04t^3 - .18t^2 \overset{\text{SET}}{=} 0$$

$$\Longrightarrow t^2(.04t - .18) = 0 \Longrightarrow$$

y=t-9/2



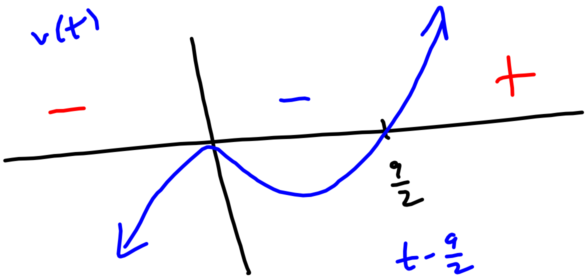
$t^2 = 0$ or $.04t - .18 = 0$

$t = 0$

$4t - 18 = 0$

$t = \frac{18}{4} = \frac{9}{2}$

v(t)



$.04t^3 - .18t^2$

$t^2(.04(t - \frac{9}{2}))$

$v' < 0$ on $(0, \frac{9}{2})$

$v' > 0$ on $(\frac{9}{2}, \infty)$

How far "left?"

$A = \left| f(\frac{9}{2}) - f(0) \right|$

How far "right?"

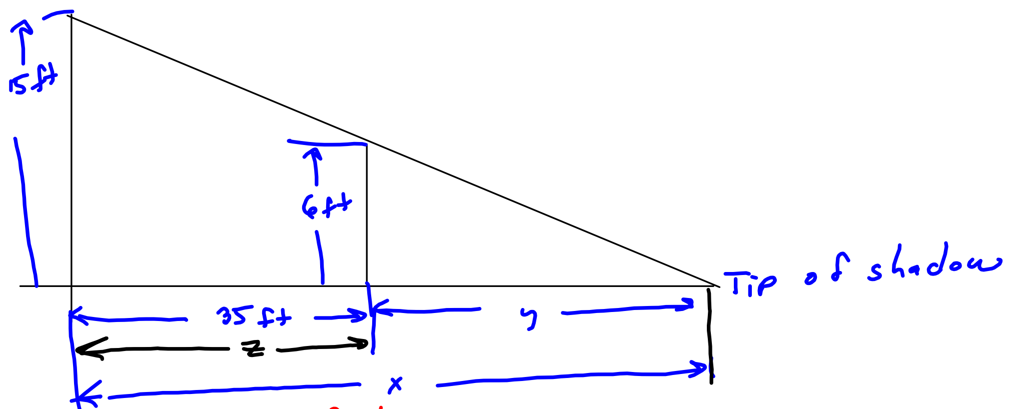
$B = \left| f(12) - f(\frac{9}{2}) \right|$

$\Longrightarrow A + B =$ 106.4137500

My notes on this one sucked. Good one to ask about, Phoenix. Very embarrassing.

7. [–/1 Points] DETAILS SCALC8 2.8.015. PRACTICE ANOTHER

A street light is mounted at the top of a 15-ft-tall pole. A man 6 ft tall walks away from the pole with a speed of 7 ft/s along a straight path. How fast is the tip of his shadow moving when he is 35 ft from the pole?



.exion ;

Let x = distance (in feet) of the tip of the shadow from the lamp pole, as a function of...

... t = time, in seconds, and let

y = distance (in ft) of the tip of shadow to the man.

WANT The speed of the tip of the shadow when → velocity

the man is 35 ft from the light pole

Want $\frac{dx}{dt}\Big|_{x=35\text{ ft}}$ → No. When $z=35$.

Let $z=$ distance from the lamp to the man (ft)

We KNOW $\frac{dz}{dt}=7\ \frac{\text{ft}}{\text{sec.}}$

How do we RELATE $\frac{dx}{dt}$ to that?

By relating x to z!

$$\frac{15}{x}=\frac{6}{y} \quad \& \quad y=x-z$$

$$\Rightarrow \frac{15}{x}=\frac{6}{x-z}$$

$$\Rightarrow 15x-15z=6x$$

$$9x=15z$$

$$x=\frac{15}{9}z=\frac{5}{3}z$$ Differentiate:

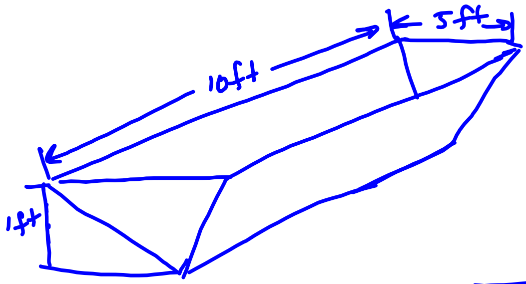
$$\frac{dx}{dt}=\frac{5}{3}\frac{dz}{dt}=\frac{5}{3}(7)=\frac{35}{3}\text{ ft/s.}$$

1. [–/1 Points] DETAILS SCALC8 2.8.026.MI. PRACTICE ANOTHER

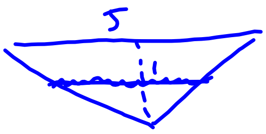
A trough is 10 ft long and its ends have the shape of isosceles triangles that are 5 ft across at the top and have a height of 1 ft. If the trough is being filled with water at a rate of 15 ft^3/min, how fast is the water level rising when the water is 9 inches deep?

Let V= Volume of water as function of t = time in minutes.
Let h = height of the water as function of t.

Put this below or ABOVE THE FIGURE.



$V(t)$:



Volume = Area times length of trough.
= Area of triangle as function of h times 10 ft.

Area of Δ = $\frac{1}{2}$base $\cdot$ height
$= \frac{1}{2}(5h)(h)$, since $b=5$ when $h=1$
$= \frac{5}{2}h^2$

$V = V(t) = \frac{5}{2}h^2 \cdot 10 = 25h^2 = 25h(t)^2$

We know $V'(t) = 15 \frac{ft^3}{min} = \frac{dV}{dt}$

h in ft
10 is 10 ft $\Big\}$ $\frac{5}{2}(h\,ft)^2(10\,ft) = 25h^2\,ft^3$

Want $\left.\frac{dh}{dt}\right|_{h=9}$

$V = 25h^2$

$\frac{dV}{dt} = 25(2)h \cdot \frac{dh}{dt} = 15$

$50hh' = 15$

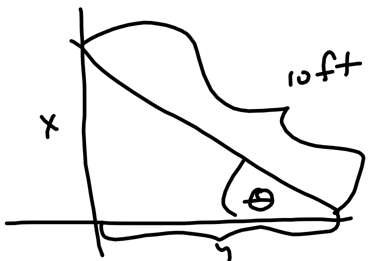
$h' = \frac{15}{50h} = \frac{15}{50(9)}$

No. 9 inches, not 9 ft!

$h' = \frac{15}{50(\frac{3}{4})} = \frac{60}{150} = \frac{6}{15} = \boxed{\frac{2}{5}\,ft/min}$ $(9'')\left(\frac{1\,ft}{12''}\right) = \frac{3}{4}\,ft$

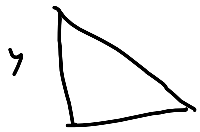
Not a pretty writeup

A 10-foot ladder is (was) resting against a wall. It starts sliding out of control!



Want $\left.\frac{d\theta}{dt}\right|_{y=6\text{ ft}}$

Book did



which is better.

$\frac{x}{y} = \tan\theta$

$\frac{dx}{dt} = 1.4\text{ ft/s}$

$x = y\tan\theta$

$1.4\text{ ft/s} = \frac{dx}{dt} = \frac{dy}{dt}\tan\theta + \left(y\sec^2\theta\right)\frac{d\theta}{dt}$

→ Need $\frac{dy}{dt}$.

We do know

$x^2+y^2 = 10^2$

$\Longrightarrow y^2 = 100 - x^2$

$y = \sqrt{100-x^2}$

we'll get $\frac{dy}{dt}$ from this

DON'T NEED

$\frac{dy}{dt}$ is given to be $1.4\ \frac{\text{ft}}{\text{sec}}$