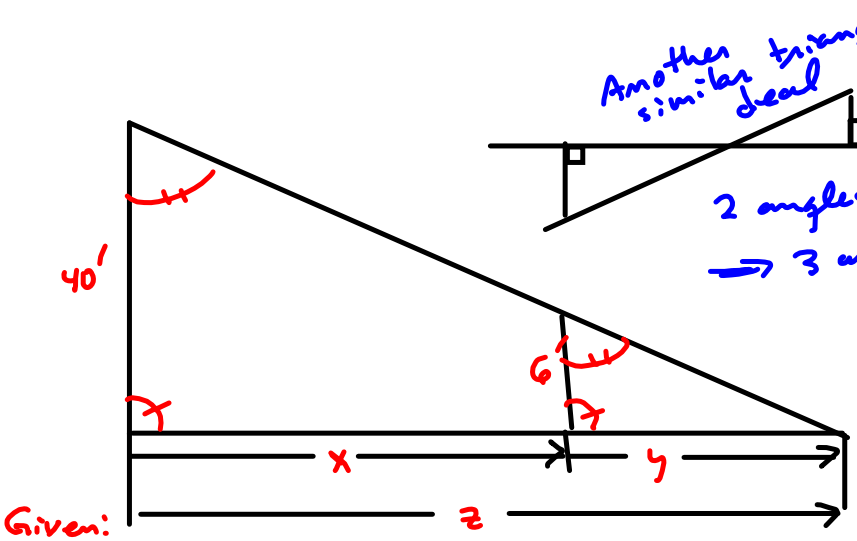


Given:

$\frac{dx}{dt} = 4 \frac{ft}{s}$

Want:

$\frac{dz}{dt} = \frac{d(x+y)}{dt}$

$$\frac{y}{6} = \frac{x+y}{40} = \frac{z}{40}$$

$$40y = 6x + 6y$$

$$34y = 6x$$

$$y = \frac{6}{34}x = \frac{3}{17}x$$

$$y' = \frac{3}{17}x'$$

$$z = x + y = x + \frac{3}{17}x = \frac{20}{17}x$$

$$z' = x' + y' = x' + \frac{3}{17}x' = \frac{20}{17}x' = \frac{20}{17} \cdot 4$$

$$4.70588 \approx \frac{80}{17} \text{ ft/s}$$

$$\frac{z(60.1) - z(60)}{60.1 - 60}$$

Exam Question
Related Rates

Word Problems.
State what you're after
" " " given
Assign variables. Words & Units
Draw picture.

I'm big on

"t = time (in minutes)"

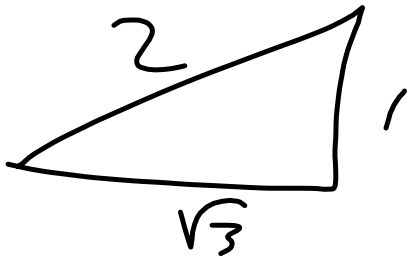
Approximate $\cos(27^\circ)$ with linearization

$f(x) = \cos x \qquad x_1 = 30^\circ = (30^\circ)\left(\frac{\pi \text{ rads}}{180^\circ}\right) = \frac{\pi}{6}$

Need $x - x_1 = \Delta x = (3^\circ)\left(\frac{\pi}{180}\right) = \frac{\pi}{60} = x - x_1$

for $y = m(x - x_1) + y_1$

$f'(x) = -\sin x$



$f(x_1) = \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$

$f'(x) = -\sin\left(\frac{\pi}{6}\right) = -\frac{1}{2}$

$L(x) = f'(x)(x - x_1) + f(x_1)$ $\qquad f'(x_1)(x - x_1) + f(x_1)$

$m(x - x_1) + y_1 \qquad = -\frac{1}{2}\left(\frac{\pi}{6} - \frac{\pi}{60} - \frac{\pi}{6}\right) + \frac{\sqrt{3}}{2}$

$= -\frac{1}{2}\left(x - \frac{\pi}{6}\right) + \frac{\sqrt{3}}{2}$

$\frac{\pi}{6} - \frac{\pi}{60}$

$\Rightarrow L(x_1 + \Delta x) = -\frac{1}{2}\left(\frac{\pi}{60}\right) + \frac{\sqrt{3}}{2}$

But $x - \frac{\pi}{6}$ IS Δx