

page of derivs

- logarithmic

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related rates

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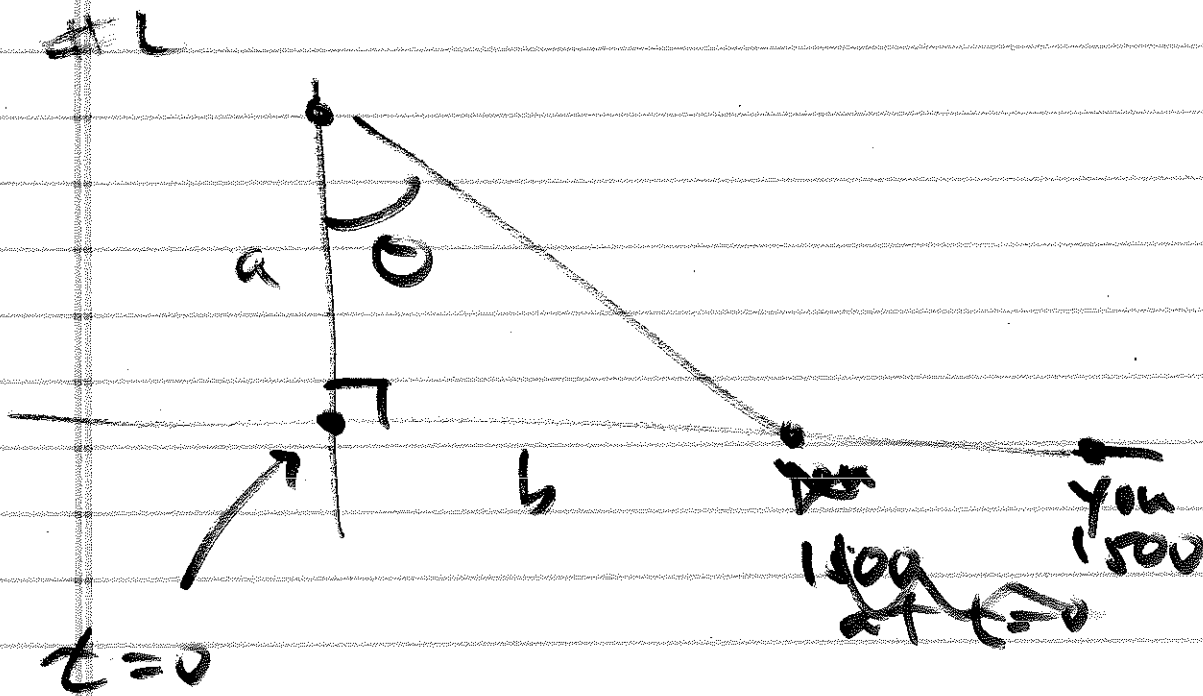
linear approx

L'Hôpital

parametric eqns

optimization

graphing



$$\frac{da}{dt} = 50 \text{ ft/sec}$$

$$(a) \quad \frac{b}{a} = \tan \theta \quad \checkmark$$

$$(b) \quad t=40 \quad b=1500$$

$$\frac{db}{dt} = 150 \text{ ft/sec}$$

$$\frac{dL}{dt} = ?$$

$$h = a \tan \theta$$

$$\frac{dh}{dt} = \frac{da}{dt} \tan \theta + a \sec^2 \theta \frac{d\theta}{dt}$$

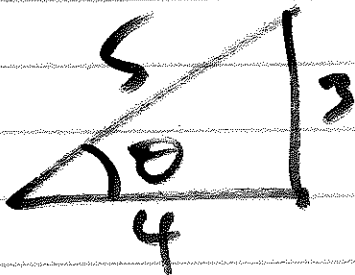
$$c = ?$$

$$a = ?$$

$$a = 50 \text{ ft/sec} \times 40 \text{ sec} \\ = 2000 \text{ ft}$$

$$\theta ! \quad \tan \theta = \frac{h}{a} = \frac{1500}{2000} \\ = \frac{3}{4}$$

$$\tan \theta = 3/4$$



$$\sec \theta = 5/4$$

$$f(x) = x^3$$

$$f'(x) = 3x^2$$

~~→~~

$$x = (t-2)^3$$

$$y = (t-2)^3 + 3(t-2)$$

$$y = 0 \quad t = ?$$

$$(t-2) \left[ (t-2)^2 + 3 \right] = 0$$

$$\uparrow$$
$$t=2$$

$$(t-2)^2 = -3$$

$$t-2 = -\sqrt{3}, \sqrt{3}$$

$$t = 2, 2-\sqrt{3}, 2+\sqrt{3}$$

↗

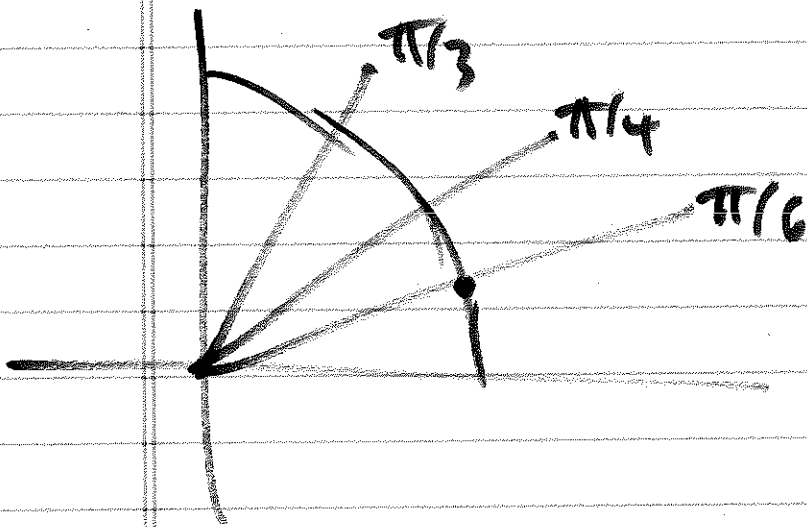
↑  
1st

↑  
2nd

# Exact Answer

$h(1)$

$e^0$



trig values

$$y = 0$$

$$x = (e - 2)^2 = 3$$

$$y - 0 = m(x - 3)$$

$$\frac{dy/dt}{dx/dt}$$

$$y^3 - 2y^2 - x^2 + 3xy = 0$$

$$x = 0$$

$$y^3 - 2y^2 = 0$$

$$y^2(y - 2) = 0$$

$$y = 0, 2$$

$$(0, 0) \quad (0, 2)$$

$$3y^2 y' - 4y y' - 2x \\ + 3y + 3x y' = 0$$

$$3y^2 y' - 4yy' + 3xy' = 2x - 3y$$

$$y'(3y^2 - 4y + 3x) = 2x - 3y$$

$$y' = \frac{2x - 3y}{3y^2 - 4y + 3x}$$

$$f(x) = (x-1)^2 e^x$$

(a) int

$$y: f(0) = 1 \quad (0, 1)$$

$$x: \underbrace{(x-1)^2 e^x}_{\neq 0} = 0$$

$$(x-1)^2 = 0$$

$$x = 1 \quad (1, 0)$$

(b) asymptote

no vert

have  $\lim_{x \rightarrow \pm\infty} f(x)$



$$\lim_{x \rightarrow \infty} (x-1)^x e^x = \infty$$

$$\lim_{x \rightarrow -\infty} (x-1)^x e^x$$

$\infty \quad 0$

$$\lim_{x \rightarrow -\infty} \frac{(x-1)^x}{e^{-x}} \quad \frac{\infty}{\infty}$$