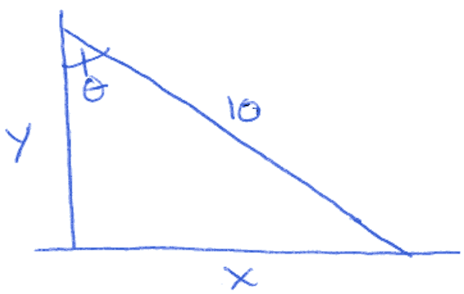
Math 131, Spring 2004
Quiz #7, Discussion Section A (Thursday, 11:00-12:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID# ______________

1. A ladder 10 feet long rests against a vertical wall. Let θ be the angle between the wall and the ladder. The bottom of the ladder is sliding away from the wall at a rate of 2 feet/sec. How fast is θ changing when the bottom of the ladder is 6 feet from the wall?



$\frac{dx}{dt} = 2$ ft/sec

want $\frac{d\theta}{dt}$ @ $x=6$

relate x, θ & 10

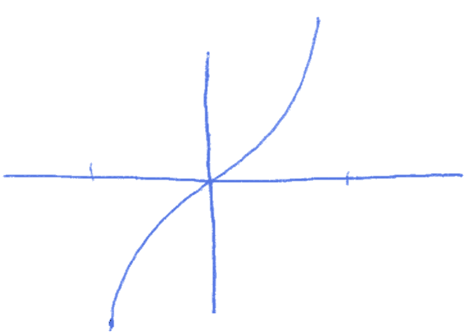
$\sin\theta = \frac{x}{10}$

$\cos\theta \frac{d\theta}{dt} = \frac{1}{10}\frac{dx}{dt} \Rightarrow \frac{d\theta}{dt} = \frac{1}{\cos\theta \; 10} \cdot \frac{dx}{dt}$

$x=6 \Rightarrow y = \sqrt{10^2 - 6^2} = \sqrt{64} = 8$

$\cos\theta = \frac{8}{10} = \frac{4}{5} \Rightarrow \frac{d\theta}{dt} = \frac{5}{4} \cdot \frac{1}{10} \cdot 2 = \frac{1}{4}$

2. Sketch the graph of a function whose domain is NOT $(-\infty, \infty)$ that has no absolute maximum or absolute minimum.



Math 131, Spring 2004
Quiz #7, Discussion Section B (Tuesday, 12:00-1:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID#__________

1. A cake is put in an oven whose temperature is 350° F. After t hours, its temperature $T = 350 - 200e^{-t}$. Use differentials to estimate the **change** in temperature of the cake during the first 0.2 hour. What is the expression for the exact change?

$T = 350 - 200e^{-t} \Rightarrow dT = 200e^{-t}\,dt$

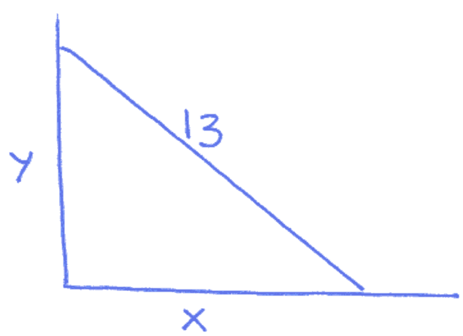
So $t = 0,\ dt = 0.2 \Rightarrow dT = 200 \cdot 0.2 = 40$

exact change: $T(0.2) - T(0) = 350 - 200e^{-0.2} - (350 - 200)$

$= 200 - \frac{200}{e^{0.2}}$

≈ 36.25

2. A ladder 13 feet long rests against a vertical wall. The bottom of the ladder is sliding away from the wall at a rate of 5 feet/sec. How fast is the top of the ladder sliding when the base is 12 feet from the wall.



Given $\frac{dx}{dt} = 5$

want $\frac{dy}{dt}$ at $x = 12$

Know: $x^2 + y^2 = 13^2$

$\Rightarrow 2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$

$\Rightarrow \frac{dy}{dt} = -\frac{x}{y}\frac{dx}{dt}$

$x = 12 \Rightarrow y^2 = 3^2 - 12^2 \Rightarrow y = 5$

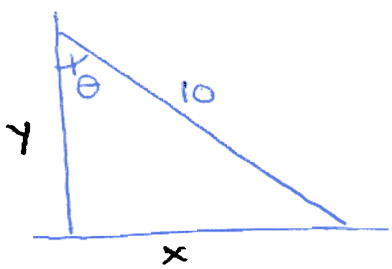
So $\frac{dy}{dt} = -\frac{12}{5} \cdot 5 = -12$ ft/sec

Math 131, Spring 2004
Quiz #7, Discussion Section C (Thursday, 12:00-1:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID#

1. A ladder 10 feet long rests against a vertical wall. Let θ be the angle between the wall and the ladder. The bottom of the ladder is sliding away from the wall at a rate of 2 feet/sec. How fast is θ changing when the bottom of the ladder is 6 feet from the wall?



Given $\frac{dx}{dt} = 2$; find $\frac{d\theta}{dt}$ at $x = 6$

relate $x, \theta,$ & 10

$$\sin\theta = \frac{x}{10}$$

$$\Rightarrow \cos\theta \frac{d\theta}{dt} = \frac{1}{10} \frac{dx}{dt}$$

$$\Rightarrow \frac{d\theta}{dt} = \frac{1}{10\cos\theta} \frac{dx}{dt}$$

$$x = 6 \Rightarrow y = \sqrt{10^2 - 6^2} = \sqrt{64} = 8$$

$$\Rightarrow \cos\theta = \frac{8}{10} = \frac{4}{5}$$

So $\frac{d\theta}{dt} = \frac{5}{10 \cdot 4} \cdot 2 = \frac{1}{4}$

2. Sketch the graph of a function that has a local maximum and a local minimum, but no absolute minimum.