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 $\theta$ 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 $\theta$ changing when the bottom of the ladder is 6 feet from the wall?

\[
\frac{dx}{dt} = 2 \text{ ft/sec}
\]

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

relate $x, \theta \times 10$

\[
\sin \theta = \frac{x}{10}
\]

\[
\cos \theta \frac{d\theta}{dt} = \frac{1}{10} \frac{dx}{dt} \Rightarrow \frac{d\theta}{dt} = \cos \theta \times 10 \cdot \frac{dx}{dt}
\]

\[x = 6 \Rightarrow y = \sqrt{10^2 - 6^2} = \sqrt{14} = 8\]

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

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:**

$$T(0.2) - T(0) = 350 - 200e^{-0.2} - (350 - 200) = 200 - \frac{200}{e^{0.2}} \approx 30.25$$

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 $\frac{dy}{dt} = -\frac{12}{5} \cdot 5 = -12 \text{ ft/sec}$
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 $\theta$ 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 $\theta$ changing when the bottom of the ladder is 6 feet from the wall?

![Diagram of a ladder against a wall]

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

relate $x$, $\theta$, & 10

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

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

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

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

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

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

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