

Math 180
Fall, 2008

Name _____

Homework #10

Due Wednesday, October 15

No late papers accepted! No excuses!

1. A 13-foot ladder is leaning against a house when its base starts to slide away. By the time the base is 12 feet from the house the base is moving at a rate of 5 feet per second.
 - a) How fast is the top of the ladder sliding down the wall then?
 - b) At what rate is the area of the triangle formed by the ladder, wall, and ground changing then?
 - c) At what rate is the angle between the ladder and the ground changing then?

2. A balloon is rising vertically above a level, straight road at a constant rate of 1 foot per second. Just when the balloon is 65 feet above the ground, a bicycle moving at a constant rate of 17 feet per second passes under it. How fast is the distance between the bicycle and balloon increasing 3 seconds later?

3. Find the linearization of $f(x) = \sqrt{x+1} + \sin x$ at $x = 0$. Use the linearization to approximate $f(0.1)$.

4. Find all values of the constants a and b for which the function

$$f(x) = \begin{cases} ax, & x < 2 \\ ax^2 - bx + 3, & x \geq 2 \end{cases}$$

will be differentiable for all values of x ?

5. Derive the derivative of $y = \arcsin x$ using implicit differentiation.