

Objectives:

- Begin reviewing for Exam 2. (This is in no way a complete review! See the course website for more review materials.)

Taking Derivatives: Find $\frac{dy}{dx}$ for each of the following:

1. $y = \sin(\arctan(x^2))$

2. $y = 2^x x^2$

3. $xy = y^3 + 23$

4. $y = x^{\sin(x)}$

5. $y = e^{20}$

6. $y = \sin(x) \csc(x) \tan(x)$

7. $\cos(y)(\sin(x))^2 = x^2 y^3 + 1$

8. $y = \frac{(6x^3 - 3x)^7}{(x^7 - 7)^4}$

9. $y = e^{\csc(x^3 - x)}$

10. $y = (3x^2 - 2x + 1)^x$

Applications (Word Problems):

1. Suppose a 5 foot plank is leaning against a wall. The top of the plank is sliding down the wall at a rate of 1 foot per second. How quickly is the bottom of the plank sliding away from the wall when the top of the plank is 4 feet above the ground?

2. *Challenge:* In some areas, highway speed limits are enforced by measuring the speed of a car from a plane. Suppose a car is driving on a highway with speed limit 70 mph. A speed enforcement plane flies towards the car at a constant altitude of 0.5 miles and a constant speed of 150 miles per hour. The car drives towards the plane at an unknown speed. At a particular time, the pilot's radar indicates that the direct distance from the car to the plane is 1 mile, and this distance is decreasing at a rate of 190 miles per hour. At this point in time, is the car speeding?