

**Worksheet 2, Tuesday, January 30th, 2018**

1. Compute  $f'(x)$  where  $f(x) = \sec x \tan x$ .
2. Compute  $f'(x)$  where  $f(x) = \frac{\sin x + \cos x}{\sec x \tan x}$ . (Watch the denominator) Do Not Simplify.
3. Compute  $f'(x)$  where  $f(x) = \cos^4(x^3 - 5)$ . Simplify.
4. Compute the derivative  $\frac{dy}{dx}$  for the curve  $y^2 + \cos x = xy$ .
5. Compute the equation of the tangent line to the curve  $\sin(x^2y) + 6 \tan x + 1 = y^3$  at the point  $(0, 1)$ .
6. Let  $f(x) = \frac{1}{2 \tan^2 x} + \cos^2 x + \sec(2x)$ . Find  $f'(\frac{\pi}{6})$ . **Simplify** your answer to a single real number.
7. The top of a ten foot ladder is sliding down a vertical wall at the rate of one foot every second. Consider the angle formed by the bottom of the ladder and the ground. How fast is this angle changing when the top of the ladder is three feet above the ground?
8. A train is travelling east on a straight track at 40 mph. The track is crossed by a road going north and south, and a house is on the road one mile south of the track. Draw the straight line connecting the house to the train. Consider the angle between the road and this line, as measured at the house. How fast is this angle changing when the train is 3 miles east of the road?
9. CHALLENGE: Differentiate  $\frac{d}{dx} \cos \left( \frac{\frac{6}{x^6} + \tan(3x)}{\frac{4}{x} + \sec x} \right)$  Do Not Simplify.

**Turn in your own solutions.**