

Worksheet #3

(Due Friday, August 30)

Problem 1. Calculate the derivatives of the following functions:

a)

$$y = \csc(\tan(x))$$

b)

$$y = \sqrt{\frac{x+1}{x^2-2x}}$$

c)

$$y = x^2 \cos(x^2)$$

d)

$$y = \frac{(x+1)^4}{x-2}$$

Problem 2. Suppose you have an object moving horizontally. Their position with respect to its original position x as a function of time (in seconds) is described as:

$$x(t) = \frac{t \cos(t)}{t^2 + 1}$$

Calculate the instantaneous velocity of this object at:

- a) The start of its movement.
- b) After 10 seconds.

Problem 3. Suppose you have a bicycle store and you want to analyse the potential profits of a new bike. Analysis with similar bikes has shown that the demand follows a linear relationship. Sales in other stores have provided you the following data points for the demand function.

p (\$/bike)	200	190	176.67	163.33
x (bike)	10	40	80	120

Suppose also that putting each bike in the store costs \$100 and you need to make an initial investment of \$1200 to start selling the bikes.

- a) Construct the profit function $P(x)$.
- b) At approximately what number of units sold will you start making a profit?
- c) Calculate your marginal profit at that number of units.