Assigned date: 09/27/2021 9am
Due date: 10/04/2021 5pm

Last name: _____

First name: _____

Section: _____

Question:	1	2	3	4	5	6	Total
Points:	20	20	20	10	15	15	100
Score:							

Instructions: You must answer all the questions below and upload your solutions (in a PDF format) to Gradescope (go to `www.gradescope.com` with the Entry code GEK6Y4). Be sure that after you scan your copy, it is clear and readable. You must name your file like this: `LASTNAME_FIRSTNAME.pdf`. A homework may not be corrected if it's not readable and if it's not given the good name. No other type of files will be accepted (no PNG, no JPG, only PDF) and no late homework will be accepted.

Make sure to show all your work!

Good luck!

Find the derivative of the following functions.

(a) (10 points) $f(x) = \frac{\cos x}{1 + \cos x}$.

(b) (10 points) $f(x) = x \tan x$.

Use the chain rule to find the derivative of the following functions.

(a) (10 points) $f(x) = \left(\frac{x}{x+1}\right)^2$.

(b) (10 points) $f(x) = \cos(\sin(2x))$.

Use implicit differentiation to find the tangent line at the point $P = (3,3)$ to the curve[1] $y = y(x)$ given by the implicit equation

$$x^4 + y^3 = 36y.$$

———————————————

[1]Use Desmos to get a sketch of the curve... The top portion of the curve looks like the shape of a Fuji apple (Miam)! What do you think, do you agree?

The quantity of charge Q in coulombs (C) that has passed through a point in a wire up to time t (measured in seconds and $t \geq 0$) is given by $Q(t) = t^3 - \frac{3}{2}t^2 + 6t + 2$. The current I that passes through the wire is the derivative with respect to time t of the charge function.

(a) (5 points) Find the current at time $t = 0.5$ s.

(b) (5 points) Find the possible time when the current is zero.

The height of a triangle is increasing at a rate of 2 cm/min while the area of the triangle is inscreasing at a rate of 2 cm^2 /min. At what rate is the base of the triangle changing when the altitude is 10 cm and the area is 10.

QUESTION 6 (15 points)

(a) (10 points) Use a linear approximation (or differentials) to estimate the value of $\sqrt{4.1}$.

(b) (5 points) Compare your approximation with the value given by your computer.