

Assigned date: 10/11/2021 9am
Due date: 10/18/2021 5pm

Last name: _____
First name: _____
Section: _____

Question:	1	2	3	4	5	6	Total
Points:	20	20	20	20	10	10	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!

QUESTION 1 (20 points)

Find the absolute maximum and absolute minimum of the functions on the given interval.

(a) (10 points) $f(x) = (t^2 - 4)^3$ on $[-2, 3]$.

(b) (10 points) $f(u) = \sqrt{3} \cos x + \sin x$ on $[-\pi, \pi]$.

QUESTION 2

(20 points)

- (a) (10 points) Show that the equation $2x + \cos x = 0$ has exactly one real root.
- (b) (10 points) Let $f(x) = \sqrt[3]{x}$. Find all numbers c inside the interval $[-8, 8]$ such that the slope of the secant line passing through the points $(-8, f(-8))$ and $(8, f(8))$ is equal to the slope of the tangent line at $(c, f(c))$.

QUESTION 3

(20 points)

For the given function, find the where f is increasing or decreasing, find the local maximum and local minimum values of f , and find the intervals of concavity and the inflection points. If possible, mention justify if you have a global maximum or minimum. Justify all your answers using the the derivatives.

(a) (10 points) $f(x) = x^4 - 2x^2 + 3$.

(b) (10 points) $f(x) = \sin x + \cos x$ for $0 \leq x \leq 2\pi$. [You can use Desmos to know where the derivative and the second derivative are positive and negative. Make sure to insert the picture you obtained in your answer.]

QUESTION 4

(20 points)

Find the horizontal asymptotes and vertical asymptotes of each curve.

(a) (10 points) $y = \frac{5+4x}{x+3}$.

(b) (10 points) $y = \frac{1+x^4}{x^2-x^4}$.

QUESTION 5

(10 points)

By following the steps shown in the lecture notes, sketch the graph of the function

$$f(x) = \frac{x^2 + 1}{x^2 - 1}.$$

QUESTION 6**(10 points)**

The sum of two positive numbers is 16. What is the smallest possible value of the sum of their squares?