

Math 31A
Differential and Integral Calculus

Midterm 1 Practice

Instructions: You have 50 minutes to complete this exam. There are four questions, worth a total of ?? points. This test is closed book and closed notes. No calculator is allowed.

For full credit show all of your work legibly. Please write your solutions in the space below the questions; INDICATE if you go over the page and/or use scrap paper.

Do not forget to write your name, discussion and UID in the space below.

Name: _____

Student ID number: _____

Discussion: _____

Question	Points	Score
1	0	
2	0	
3	0	
4	0	
Total:	0	

Problem 1.

Differentiate the following functions.

(a) $f(x) = (6x^4 - 3x^2 + 1)\sqrt{x}$.

(b) $f(x) = \frac{x^4 \sin x}{x^2 + x + 1}$

(c) $f(x) = \tan^3 x + \sin(3x) \tan(x^3)$.

(d) $f(x) = \sin(\cos(\sin x))$.

Problem 2.

Suppose that $y = 5 - 2x$ is the tangent line to $y = f(x)$ at $x = 3$ and that $y = 2 + 3x$ is the tangent line to $y = g(x) + x$ at $x = 3$.

What is the tangent line to the function $y = h(x) = f(x)g(x) + x^2$ at $x = 3$?

Problem 3.

(a) Find the points on the graph of $y^2 = x^3 - 3x + 1$ where the tangent line is horizontal.

(b) The tangent line to the graph of

$$y^2 + 2xy - y = x^3 - 2x^2 + 2x$$

at the point $(0, 1)$ crosses the graph at one other point. Find it.

Problem 4.

Evaluate the following limits.

(a) $\lim_{x \rightarrow 0} \left[(1 - \cos x) \sin \left(\frac{1}{x} \right) \right]$

(b) $\lim_{x \rightarrow 3} \frac{x - \sqrt{x+6}}{x-3}$.

(c) $\lim_{x \rightarrow 0} \frac{1 - \cos x}{\sin x}$.

(d) $\lim_{x \rightarrow 0^+} \frac{2 - \cos x}{\sin x}$.