

Math 1271 Midterm Exam I (2/24/2015)

Version I

Name: _____

Student ID: _____

Discussion Section: _____

#	Score
1	
2	
3	
4	
5	
Total	

The exam consists of 5 problems out of 50 total points. Read the directions of each problem carefully. Please show your work when necessary, unless stated otherwise. Clearly indicate your final answers.

1. (5 points each) Evaluate each of the following limits.

(a) $\lim_{x \rightarrow +\infty} (\sqrt{4x^2 + 3} - 2x)$

(b) $\lim_{x \rightarrow 0.5^-} \frac{2x - 1}{|2x^2 - x|}$

(c) $\lim_{x \rightarrow 0} \frac{\sin(3x)}{5x^3 - 4x}$

2. (5 points each) Differentiate each of the following functions.

(a) $f(x) = \frac{x}{2 - \cot x}$

(b) $f(x) = xe^x \csc x$

(c) $f(x) = \sqrt{\frac{e^x - 1}{e^x + 1}}$

3. (8 points) Let $f(x) = (x^2 - 1)^3$.

(a) For what values of x does the graph of $f(x)$ have a horizontal tangent line?

(b) Find the equation of the tangent line at the point where $x = 2$.

4. (6 points) Prove that the equation $\sin x = x^3 - 1$ has at least one real root.

5. (2 points for each problem) Multiple choices (There is only one correct choice for each problem.):

(a) Find all the values of x at which the function $f(x) = \frac{x-2}{(x-2)(x^2-3)}$ is not continuous: _____

- A. $\sqrt{3}, -\sqrt{3}$
- B. $2, \sqrt{3}, -\sqrt{3}$
- C. $2, \sqrt{3}$
- D. $2, 3$

(c) Find horizontal asymptote(s) of the curve $y = \frac{\sqrt{x^2+1}}{x+3}$ _____

- A. $y = 1$
- B. $y = 0$
- C. $y = -1$
- D. Both $y = 1$ and $y = -1$

(e) If the cost of producing x ounces of gold from a gold mine is $C = f(x)$ dollars, what is the unit of $f'(5)$? _____

- A. ounce
- B. dollar
- C. ounces per dollar
- D. dollars per ounce