

MAT 125 Practice Mid Term

Name:

ID Number:

Read all of the following information before starting the exam:

- Show all work, clearly and in order, if you want to get full credit. No work, no credit.
- Calculators are not permitted.
- Write clearly. If the grader is unable to understand what you have written, you may receive no credit.
- Attempt all problems.
- Good luck!

1. (20 points) Draw the graph of the functions:-

a. (5 pts)

$$y = |\ln(|x| + 5)|$$

b. (5 pts)

$$y = |x^3 + 1|$$

c. (5 pts)

$$y = |e^{x-2} - 3|$$

d. (5 pts)

$$y = ||x| - 3|$$

2. (15 points) Find $f^{-1}(x)$ for the following functions:-

a. (5 pts)

$$f(x) = \ln(3x + 2) + 4$$

b. (5 pts)

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

c. (5 pts)

$$f(x) = \frac{1}{x}$$

3. (15 points) Simplify the following expression. The final answer should be a number.

a. (5 pts)

$$\log_5 60 - \log_5 3 - \log_5 4$$

b. (5 pts)

$$2 \log_6 18 + \log_6 4$$

c. (5 pts)

$$\ln \sqrt{e}$$

4. (20 points) Evaluate the following limits:-

a. (5 pts)

$$\lim_{x \rightarrow 3} \frac{x^2 - 6x + 9}{x - 3}$$

b. (5 pts)

$$\lim_{x \rightarrow 2} \frac{x^2 - 6x + 8}{x - 1}$$

c. (5 pts)

$$\lim_{x \rightarrow \infty} \frac{3x^5 + 7x + 1}{2x^5 + x^4 + 8x + 1}$$

d. (5 pts)

$$\lim_{x \rightarrow 2} \ln \left(\frac{x^2 - 3x + 2}{x - 2} \right)$$

5. (25 points) Using the definition of derivative, evaluate $f'(x)$

a. (5 pts)

$$f(x) = x^2$$

b. (5 pts)

$$f(x) = x^3$$

c. (5 pts)

$$f(x) = \frac{1}{x}$$

d. (5 pts)

$$f(x) = \sqrt{x}$$

e. (5 pts)

$$f(x) = \frac{1}{\sqrt{x}}$$

6. (20 points) Find $f'(x)$ if

a. (5 pts)

$$f(x) = \frac{\sin(x)}{1 + \ln(x)}$$

b. (5 pts)

$$f(x) = (1 + x^2)(1 + e^x)$$

c. (5 pts)

$$f(x) = 5\sqrt{x} + 7\ln(x)$$

d. (5 pts)

$$f(x) = \ln(6) \cos(4)$$

- 7.** (10 points) Find the horizontal and vertical asymptotes of
- a.** (5 pts)

$$f(x) = \frac{x^2 - 4}{x^2 - 5x + 6}$$

- b.** (5 pts)

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

- 8.** (10 points) Find the equation of the tangent line to the curve $y = f(x)$ at the given point:-
- a.** (5 pts) $f(x) = 1 + x^3$ at the point $(2, 9)$.
 - b.** (5 pts) $f(x) = \ln(x)$ at the point $(1, 0)$.