

Math 19 A&B
Fall 2019
Exam 1
October 3

Name: _____

PRACTICE EXAM

This exam contains 6 pages and 7 questions. Total of points is 100. For full credit you must show your work. Partial credit may be given for incorrect solutions if sufficient work is shown. Messy/unorganized answers may be penalized, even if correct.

Grade Table (for teacher use only)

Question	Points	Score
1	24	
2	24	
3	12	
4	18	
5	12	
6	6	
7	4	
Total:	100	

HONORS PLEDGE (sign after exam is completed): I have neither given nor received aid on this exam, nor have I observed a violation of the UVM Code of Academic Integrity.

Signature: _____

1. (24 points) Determine the following limits

(a) (6 points)

$$\lim_{x \rightarrow 8^-} \frac{x+3}{x-8}$$

(b) (6 points)

$$\lim_{x \rightarrow 4^+} \frac{x^2 - x - 12}{x - 4}$$

(c) (6 points)

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

(d) (6 points)

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

2. (24 points) For the function

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

- (a) (6 points) Find any vertical asymptotes of f .

- (b) (6 points) Find any horizontal asymptotes of f .

- (c) (6 points) Find the partition numbers of f .

- (d) (6 points) Make a sign chart for f .

3. (12 points) Consider the function

$$f(x) = x^2 + 7.$$

Use the limit definition of the derivative to compute $f'(x)$. No credit will be given for using shortcuts on this problem.

- (a) (3 points)

$$f(x + h) =$$

- (b) (3 points)

$$f(x + h) - f(x) =$$

- (c) (3 points)

$$\frac{f(x + h) - f(x)}{h} =$$

- (d) (3 points)

$$f'(x) =$$

4. (18 points) Compute the following quantities. You may use shortcuts.

(a) (6 points)

$$f'(x) \quad \text{for} \quad f(x) = x^5 - 2x^3 + 4x$$

(b) (6 points)

$$\frac{d}{dx}f(x) \quad \text{for} \quad f(x) = \frac{6}{x^3} - e^x$$

(c) (6 points)

$$y' \quad \text{for} \quad y = \sqrt{x} - \ln(x)$$

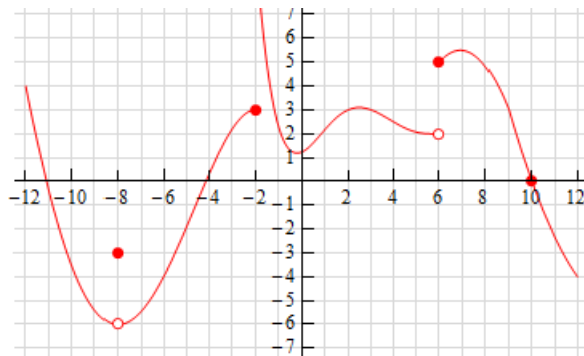
5. (12 points)

- (a) (6 points) Find the equation of the tangent line to $f(x) = x^5 - 2x^3 + 4x$ at $x = 1$.
Hint: use your answer to part (a) of the previous page.

- (b) (6 points) Find where the tangent line to $g(t) = t^4 - 18t^2$ is horizontal.

6. (6 points) Suppose \$1000 is invested with continuous compounding. At the end of 3 years, the investment is worth \$1500. Find r , the annual rate. *Hint:* the formula for continuous compounding is $F = Pe^{rt}$.

7. (4 points) Below is the graph of some function $f(x)$.



Criteria for continuity

- (i) $f(c)$ exists
- (ii) $\lim_{x \rightarrow c} f(x)$ exists
- (iii) $\lim_{x \rightarrow c} f(x) = f(c)$

Where is f discontinuous? For each point of discontinuity, which of the three continuity criteria fails?