

Math 19 E
Spring 2019
Exam 3
April 18

Name: _____

PRACTICE EXAM

This exam contains 6 pages and 6 questions. Total of points is 98. 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	20	
2	20	
3	16	
4	18	
5	14	
6	10	
Total:	98	

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. (20 points) For the function $f(x) = x^4 + 4x^3 + 30$

(a) (6 points) Calculate the first derivative of f .

(b) (6 points) Find the partition numbers of f' .

(c) (6 points) Find the intervals where f is increasing/decreasing.

(d) (2 points) Find any local extrema.

2. (20 points) For the function $f(x) = x^4 + 4x^3 + 30$

(a) (6 points) Calculate the second derivative of f .

(b) (6 points) Determine the partition numbers of f'' .

(c) (6 points) Determine the intervals where f is concave up/down.

(d) (2 points) Determine any points of inflection.

3. (16 points) For the function $f(x) = x^3 - 12x$

(a) (5 points) Calculate the first derivative.

(b) (5 points) Determine the critical numbers of f .

(c) (6 points) Find the absolute maximum and minimum on the interval $[-3, 1]$.

4. (18 points) Evaluate the following limits. Use L'Hopital's rule if it applies – do NOT factor.

(a) (6 points)

$$\lim_{x \rightarrow 7} \frac{x - 7}{x^2 - 12x + 35}$$

(b) (6 points)

$$\lim_{x \rightarrow 0} \frac{e^{5x} - 1 - 5x}{x^2}$$

(c) (6 points)

$$\lim_{x \rightarrow 0^+} \frac{\ln(1 + x^4)}{x^5}$$

5. (14 points) Evaluate the following integrals.

(a) (7 points)

$$\int (x^2 + 4x + 1) dx$$

(b) (7 points)

$$\int \left(\sqrt{x} + \frac{6}{x} \right) dx$$

6. (10 points) The area A of a healing wound changes at a rate given approximately by

$$\frac{dA}{dt} = -4t^{-3}$$

where t is time in days and $A(1) = 2$. What will the area of the wound be in 10 days?

Hint: take the integral of dA/dt to get $A(t)$, then use the fact that $A(1) = 2$ to solve for C . Finally, compute $A(10)$.