

Test Number: 1178

MA 16010

Exam 2

Spring 2025

Student's Name: _____

Section Number: _____

(Without your name and section number, we will NOT be able to locate your exam booklet.)

1. Fill out your name and section number in the space provided above. On the scantron, fill in **your name, section number, test number and student ID**. Sign your name.
2. You can write on this exam booklet. Turn in both your scantron and your exam booklet when you are done. Note: **you will be graded ONLY based on your scantron answer sheet**.
3. Only a one-line display scientific calculator is allowed. NO other electronic devices are allowed. No books or notes are allowed.
4. There are 12 questions with 8 points each for a total of 96 points. You will have 60 minutes to complete the exam. Good luck!

Instructor	Time	Section	Instructor	Time	Section
Ashton, Liam	9:30	103	Ashton, Liam	10:30	104
Delgado, Huimei	12:30	700	Delgado, Huimei	online	814
Delworth, Tim	7:30	811			
Devale, Tanmay	8:30	101	Devale, Tanmay	9:30	102
Manning, Amanda	2:30	109	Manning, Amanda	3:30	110
O'Connor, Sam	7:30	105	O'Connor, Sam	8:30	106
Robbins, Jakayla	9:30	813	Robbins, Jakayla	10:30	812
Wan, Hao	10:30	107	Wan, Hao	11:30	108

Problem 1

Given $f(x) = \frac{(2x-1)^3}{x^3-5}$, find $f'(2)$.

1. (A) -9
- (B) 24
- (C) 6
- (D) -18
- (E) -27
- (F) -3

Problem 2

Given $f(x) = -8e^{4x} \ln(2x+1)$, find $f'(0)$.

2. (A) -40
- (B) -48
- (C) -16
- (D) -24
- (E) -64
- (F) -8

Problem 3

Use implicit differentiation to find $\frac{dy}{dx}$ if

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

3. (A) $\frac{4xy - 6x}{3y^2}$
- (B) $\frac{4xy}{6x + 3y^2}$
- (C) $\frac{6x + 3y^2 - 4xy}{2x^2}$
- (D) $\frac{4xy - 6x}{3y^2 - 2x^2}$
- (E) $\frac{4xy + 2x^2 - 6x}{3y^2}$
- (F) $\frac{4xy + 2x^2}{6x + 3y^2}$

Problem 4

The position of a particle moving in a straight line is given by

$$s(t) = t^4 + \frac{3}{2}t^2 - t - 5,$$

where t is time in hours and $s(t)$ is in meters. What is the acceleration of the particle when $t = 3$ hours?

4. (A) 75 m/hr²
- (B) 84 m/hr²
- (C) 116 m/hr²
- (D) 111 m/hr²
- (E) 106 m/hr²
- (F) 98 m/hr²

Problem 5

A spherical balloon is inflating at a rate of 3 cubic inches per second. How fast, in inches per second, is the radius of the balloon increasing when the radius is 10 inches? The volume V of a sphere is $V = \frac{4}{3}\pi r^3$.

5. (A) $\frac{3}{400\pi}$
- (B) $\frac{3}{40\pi}$
- (C) $\frac{3\pi}{400}$
- (D) $\frac{\pi}{1200}$
- (E) $\frac{3\pi}{40}$
- (F) $\frac{1}{1200\pi}$

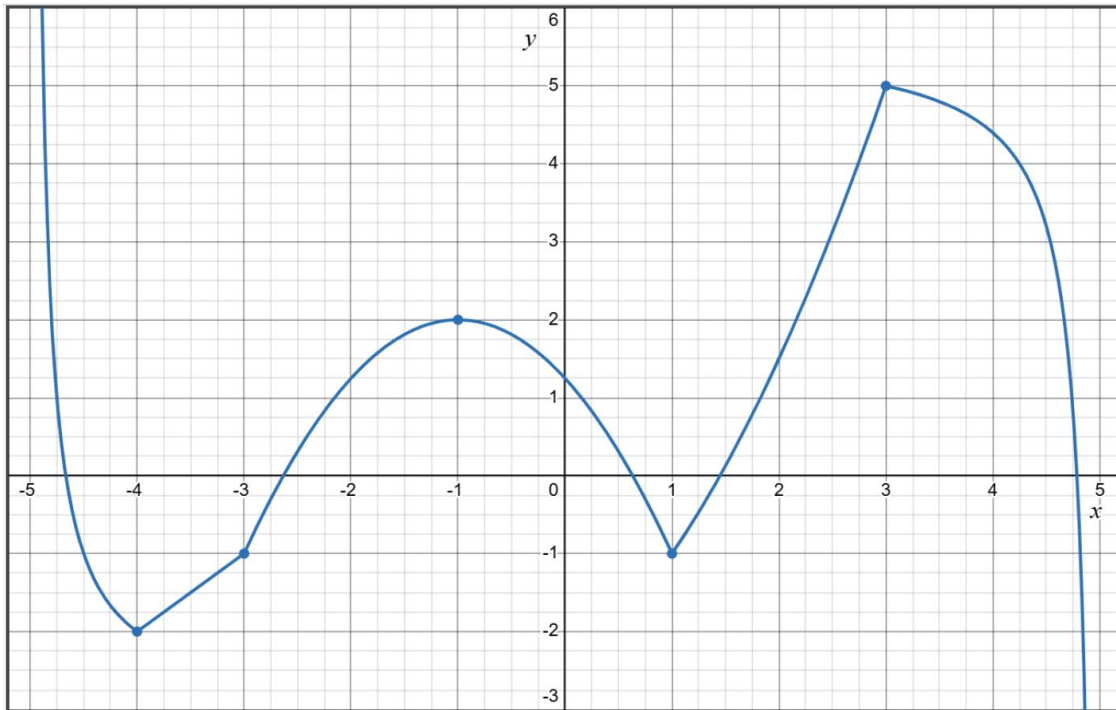
Problem 6

A 10-foot ladder is leaning against a wall when it begins to slip. The base of the ladder slides away from the wall on flat ground at a rate of 3 feet/second. How fast, in feet/second, is the top of the ladder sliding down the wall when the top of the ladder is 8 feet above the ground?

6. (A) $\frac{9}{4}$
- (B) 16
- (C) $\frac{15}{2}$
- (D) 4
- (E) $\frac{38}{3}$
- (F) 6

Problem 7

Identify the relative/local maxima of the function shown in the graph below.



7. Ⓐ $(-3, -1), (-1, 2)$
- Ⓑ $(-3, -1), (3, 5)$
- Ⓒ $(-3, -1), (-1, 2), (3, 5)$
- Ⓓ $(-4, -2), (-3, -1), (1, -1)$
- Ⓔ $(-1, 2), (3, 5)$
- Ⓕ $(-4, -2), (1, -1)$

Problem 8

Find the x -value at which $f(x) = 2x^3 + 15x^2$ has a relative maximum.

8. (A) $\frac{1}{6}$
- (B) $-\frac{15}{2}$
- (C) 0
- (D) $\frac{1}{5}$
- (E) -5
- (F) -24

Problem 9

Given the **derivative**, $f'(x) = (x + 8)^2(x - 4)$, choose the correct statement regarding $f(x)$.

9. (A) $f(x)$ is increasing on $(-\infty, 4)$.
- (B) $f(x)$ is increasing on $(-8, 4)$.
- (C) $f(x)$ is increasing on $(-8, \infty)$.
- (D) $f(x)$ is increasing on $(-\infty, -8)$ and $(4, \infty)$.
- (E) $f(x)$ is increasing on $(-\infty, -8)$.
- (F) $f(x)$ is increasing on $(4, \infty)$.

Problem 10

Consider the function, $f(x) = \frac{x^3}{3} + 3x^2 + 8x + 10$. Find the x value at which the inflection point occurs.

10. (A) $x = -2$
- (B) $x = -4$
- (C) $x = 3$
- (D) $x = -3$
- (E) $x = 2$
- (F) $x = 4$

Problem 11

Choose the correct statement about the absolute minimum and the absolute maximum of $f(x) = x^4 - 4x$ on the interval of $[0,2]$.

11. (A) absolute minimum: $(1,-3)$; absolute maximum: $(0,0)$
- (B) absolute minimum: $(1,-3)$; absolute maximum: $(2,8)$
- (C) absolute minimum: $(0,0)$; absolute maximum: $(1,-3)$
- (D) absolute minimum: $(2,8)$; absolute maximum: $(1,-3)$
- (E) absolute minimum: $(2,8)$; absolute maximum: $(0,0)$
- (F) absolute minimum: $(0,0)$; absolute maximum: $(2,8)$

Problem 12

Consider the function

$$f(x) = \frac{1}{3}x^3 - 7x^2 + 13x + 28.$$

On which interval is the graph of $f(x)$ both decreasing and concave down?

12. ☒ (A) $(1,7)$
- ☐ (B) $(7,\infty)$
- ☐ (C) $(1,13)$
- ☐ (D) $(7,13)$
- ☐ (E) $(-\infty,13)$
- ☐ (F) $(-\infty,7)$