

MATH 1650
Exam 1 – Ver A
Fall 2025

Student name: _____
Recitation instructor: _____
Section: _____

This exam is closed book and closed notes. Electronic devices, calculators, headphones, or smart watches are not allowed. There are two sections:

Section 1 – Multiple-Choice: 5-points each, No partial credit

Section 2 – Work-Out: 10-points each, Partial credit possible

SCORES

SECTION 1: Multiple-Choice

1–6	
Total	

SECTION 2: Work-Out

7	
8	
9	
10	

DO NOT BEGIN THIS EXAM UNTIL INSTRUCTED TO START

Do not write
in these boxes →
on the exam

score

Section 1 – Multiple-Choice Clearly circle one choice for each question. More than one circled answer will be considered incorrect. Space is provided for work, but no work will be graded. Each question is worth 5 points with no partial credit.

1. Let $f(x) = x^2 - 6x + 8$. If the average rate of change of $f(x)$ for $0 \leq x \leq c$ is 3, find c .

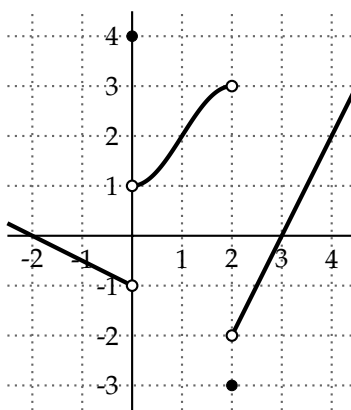
- A. $c = 1$
- B. $c = 3$
- C. $c = \frac{9}{2}$
- D. $c = 8$
- E. $c = 9$

2. Find an equation of the tangent line to $f(x) = (x + 1) \cos(\pi x)$ when $x = 1$.

- A. $y = -x - 1$
- B. $y = -x - 3$
- C. $y = x - 3$
- D. $y = 2\pi x - 1$
- E. $y = 2\pi x - 2\pi - 2$

score

3. The piecewise-defined function $f(x)$ is shown in the graph.



$$\lim_{x \rightarrow 0} f(2 + x^2) =$$

- A. does not exist
- B. 4
- C. 3
- D. -2
- E. -3

4. Given $f(x) = ae^{3x} + b(x + 1)$ find the constants a and b so that $f(0) = 1$ and $f'''(0) = 9$ where f''' is the third derivative of f .

- A. $a = 1, b = \frac{1}{3}$
- B. $a = 9, b = 1$
- C. $a = \frac{1}{3}, b = \frac{2}{3}$
- D. $a = \frac{1}{9}, b = 10$
- E. $a = \frac{1}{9}, b = 9$

score

5. Find the values of a and b that make the following function continuous:

$$f(x) = \begin{cases} \frac{3}{(x-3)^2} & x \leq 0 \\ ax + b & 0 < x \leq 1 \\ 5 - x^2 & x > 1 \end{cases}$$

- A. $a = -\frac{17}{4}, b = 5.$
- B. $a = \frac{11}{3}, b = \frac{1}{3}.$
- C. $a = -\frac{17}{4}, b = \frac{1}{3}.$
- D. $a = \frac{11}{3}, b = 5.$
- E. $a = 5, b = \frac{1}{3}.$

6. Suppose that the position of an object at any time t is given by $s(t) = 5te^{2t}$. What is the object's acceleration at $t = 0$?

- A. 0
- B. 5
- C. 10
- D. 20
- E. 40

score

Section 2 – Work-Out Answer each question completely using exact values. You do not need to simplify your answers unless otherwise indicated. Show all steps neatly and legibly. Include correct notation. **Answers without work and/or justifications will not receive full credit.** Clearly indicate your final answer for each problem. Each problem is worth 10 points. Partial credit is possible.

7. Calculate the following limit if it exists. If it does not exist explain why. No credit will be given if using L'Hospital rule.

$$\lim_{x \rightarrow 0} \left(\frac{\sin^2(3x)}{x^2 + x^3} + \frac{5x^2}{x^2 + 5x^3} \right)$$

score

8. Let $f(x) = \sqrt{5x - 7}$.

Use the limit definition of the derivative (either form) to find the derivative $f'(x)$.

NOTE: No credit will be given for a derivative found without using the limit definition.

score

9. Find $f'(x)$, where $f(x) = \frac{1 + \sec(3e^x)}{2x^2 + 5x^3}$. Do not simplify your answer.

score

10. Find all vertical and horizontal asymptotes of the following function. Use limits to justify your answer.

$$y = \frac{x^2 - 4}{3x^2 + 18x + 24}$$

score
