

MTH 1125-Final Exam- A2

Exam time: 120 minutes

Date: June 10, 2026

NAME:

STUDENT ID NUMBER (Troy ID):

General instructions:

- No discussion is allowed in the exam room.
- No electronic devices (except calculator) are allowed.

PROBLEM	POINTS	SCORE
A1	4	
A2	4	
A3	4	
A4	4	
A5	4	
A6	4	
A7	4	
A8	4	
A9	4	
A10	4	
B1	10	
B2	15	
B3	15	
B4	10	
B5	10	
TOTAL	100	

PART A: Multiple choice or Short answer

(4 mark for each correct answer/choice)

A1. Find an equation of the slant asymptote of the curve

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

Write your answer here:

A2. The *greatest integer function* is defined by $[[x]]$ the largest integer that is less than or equal to x . Find the average value of the function $f(x) = [[x - 1]]$ on the interval $[0, 2]$.

Write your exact answer here:

A3. If 1200 cm^2 of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

Write your answer here:

A4. Let $f(x) = \int_0^x (1 + t^2)e^{-t^2} dt$. Evaluate $f'(0) = ?$

Circle the best answer.

- A. 3
- B. 1
- C. 0
- D. A,B,C are incorrect.

A5. Find all vertical asymptotes of $y = \frac{x^3 - 4x}{(x^2 - 9)(x - 2)}$.

Write your answer here:

A6. Evaluate the indefinite integral $\int e^{2 \cos t} \sin(t) dt$.

Write your answer here:

A7. When a particle is located a distance x meters from the origin, a force of $\cos(\pi x) + 2$ newtons acts on it. How much work is done in moving the particle from $x = 0$ to $x = 2$?

Write your answer here:

A8. Let m be a positive integer. Evaluate

$$\lim_{x \rightarrow \infty} (e^{2x} + 1)^{\frac{m}{x}}$$

Write your answer here:

A9. A bacteria culture grows with constant relative growth rate. The bacteria count was 300 after 2 hours and 2700 after 4 hours Find the number of cells after 5 hours

Circle the best answer.

- A. 4500
- B. 8100
- C. 5000
- D. A,B,C are incorrect

A10. Let R be the bounded region by $y = x + 2x^5$, $y = 0$, $0 \leq x \leq 1$. Find the volume of the solid obtained by rotating R about y-axis.

Write the exact value here:

PART B: WRITE YOUR FULL ANSWERS.

B1. The position of a particle is given by the equation

$$s = f(t) = 2t^2 - 4t + 5$$

where s is measured in seconds and in meters.

(a) When is the particle at rest? When is the particle moving forward (that is, in the positive direction)?

(b) Find the total distance traveled by the particle during the first four seconds

B2. Let $f(x) = x^2 - 2x + 1$.

(a) Evaluate the Riemann sum for $y = f(x)$, taking the sample points to be right endpoints and $a = 0$, $b = 3$, and $n = 6$.

(b) Evaluate the Riemann sum for $y = f(x)$, taking the sample points to be the midpoints and $a = 0$, $b = 3$, and $n = 6$.

(c) Find $\int_0^3 f(x)dx$ via the limit of Riemann sum.

B3. (a) Sketch the bounded region R enclosed by the given curves and find its area: $y = x^2$ and $y = 4x$.

(b) Find the volume of the solid obtained by rotating R about $y = 4$.

(c) Find the volume of the solid obtained by rotating R about y-axis.

B4. Evaluate

$$\lim_{n \rightarrow \infty} \left(\frac{1}{\sqrt{n^2+5n}} + \frac{1}{\sqrt{n^2+10n}} + \cdots + \frac{1}{n\sqrt{6}} \right)$$

B5. Suppose that f and g are continuous on $[a, b]$ and differentiable on (a, b) . Suppose also that $f(a) = g(a)$ and $f'(x) < g'(x)$ for all $a < x < b$. Use The Mean Value Theorem to show that $f(b) < g(b)$.

-----Good luck-----

Start to write you solution (Part B).