

MTH 1125-Final Exam- NA

Exam time: 120 minutes

Date: June 8, 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

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

Write yours answer here:

A2. Evaluate $\lim_{x \rightarrow 0} \frac{\sinh x - x}{x^3}$

Write the exact value here:

A3. Find the average value of the function $f(x) = |x^2 - 1| + x$ on the interval $[-2, 1]$.

Write your exact answer here:

A4. Let a, b be the length and width of a rectangle with perimeter 60 m whose area is as large as possible. Find $a - b$?

Circle the best answer.

A. 3

B. 1

C. 0

D. A,B,C are incorrect.

A5. Find the vertical asymptotes of $y = \frac{x^2 - 2x}{(x^2 - 4)(x + 5)}$.

Write yours answer here:

A6. Evaluate the indefinite integral $\int \sqrt{x} \sin \left(1 + x^{\frac{3}{2}} \right) dx$.

Write yours answer here:

A7. When a particle is located a distance x meters from the origin, a force of $2x + 3$ newtons acts on it. How much work is done in moving the particle from $x = 0$ to $x = 2$?

Write yours answer here:

A8. Evaluate

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

Circle the best answer.

A. 0

B. ∞

C. e^2

D. A,B,C are incorrect

A9. A bacteria culture grows with constant relative growth rate. The bacteria count was 400 after 2 hours and 3600 after 4 hours Find the number of cells after 5 hours

Circle the best answer.

A. 10800

- B. 9900
 C. 12000
 D. A,B,C are incorrect

A10. Let R be the bounded region by $y = 16x - x^5, y = 0, 0 \leq x \leq 2$. 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.** (a) Evaluate the Riemann sum for $f(x) = 4x^2 - 2x + 3$, taking the sample points to be right endpoints and $a = 0, b = 2$, and $n = 4$.
 (b) Evaluate the Riemann sum for $f(x) = 4x^2 - 2x + 3$, taking the sample points to be the midpoints and $a = 0, b = 2$, and $n = 4$.

- B2.** (a) Find the derivative of the function

$$h(t) = \int_t^{2t} e^{-x^2} dx.$$

- (b) Evaluate $\lim_{x \rightarrow 0} x^{-1} \int_x^{2x} e^{-t^2} dt$.

- B3.** (a) Sketch the bounded region R enclosed by the given curves and find its area: $y = x^2$ and $y = 7x$.
 (b) Find the volume of the solid obtained by rotating R about $y = 3$
 (c) Find the volume of the solid obtained by rotating R about y-axis.

- B4.** Evaluate

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

- B5.** Find a continuous function f and a number a such that $\int_a^x (7 + 2 \sin t) f(t) dt = 2x + 10$.

-----Good luck----

Start to write you solution (Part B).