UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

AMAT100 PreCalculus Final Exam A Spring 2025

Print Name:
UAlbany Email:

Please indicate your lecture section with a check mark (✓) in the leftmost column.

✓	Class No	Professor	Days and Time
	5813	A. Wittig	MW 8:00-9:20AM
	5814	X. Dong	MW 11:40-1:00PM
	5815	A. Chilelli	TTh 9:00-10:20AM
	5816	S. Gurses	MW 1:10-2:30PM
	5817	C. Hall	TTh 12:00-1:20PM
	5818	S. Canzone	TTh 3:00-4:20PM

Directions: You have **120 minutes** to answer the following questions. ***You must show all necessary work*** as neatly and clearly as possible. Clearly indicate your final answers by placing a box or circle around it.

No calculators, notes, textbooks, mobile phones or other aids are allowed. Do not detach pages.

Problem	Possible	Points	Problem	Possible	Points
1	10		6	12	
2	12		7	8	
3	10		8	8	
4	10		9**	8	
5	9				
Total (Out of 79) =					

**Optional Extra Credit Problem

(Similar to Practice Problems 1 and Exam 1 Problem 3)

(1) (10 Points) Let

$$f(x) = x^2 - 3x$$

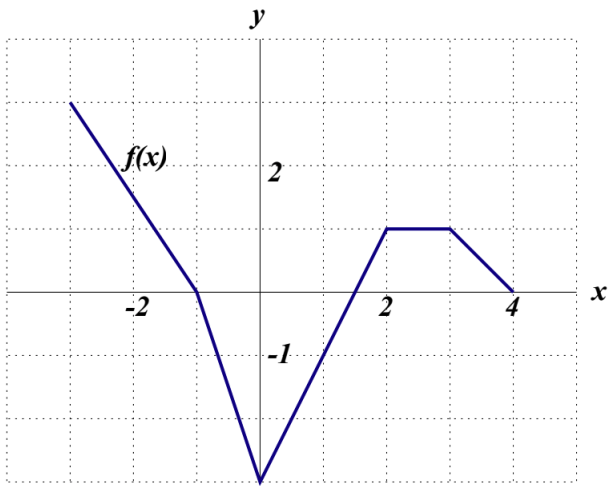
Evaluate and simplify the difference quotient:

$$\frac{f(x+h) - f(x)}{h}.$$

Assume $h \neq 0$. You must show all your work.

(Similar to Practice Problems 0 and 1, and Exam 1 Problem 7)

(2) (3 Points Each) The graph of the function f, for $-3 \leq x \leq 4$, is given below.



Circle the **best** answer. You do not need to explain.

(a) $f(2.5) =$

(i) 0 (ii) 1 (iii) 1.5 (iv) 2 (v) 2.5

(b) $f(f(2)) =$

(i) -1 (ii) 0 (iii) 1 (iv) 2 (v) 2.5

(c) f is increasing and negative on the interval

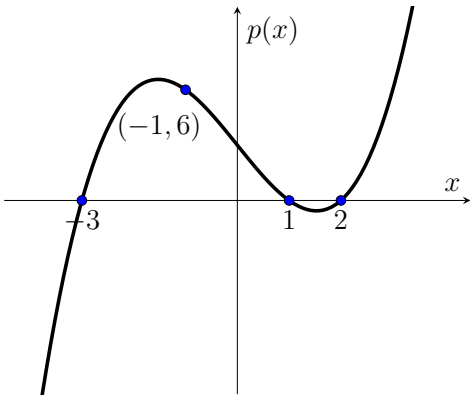
(i) $(-2, -1)$ (ii) $(-1, 0)$ (iii) $(0, 1.5)$ (iv) $(1.5, 2)$ (v) $(3, 4)$

(d) The average rate of change of f is greatest on the interval

(i) $(-2, -1)$ (ii) $(-1, 1)$ (iii) $(-1, 2)$ (iv) $(0, 2)$ (v) $(2, 4)$

(Similar to Practice Problems 9 and Exam 2 Problem 3)

(3) (10 Points) Find a possible formula for the polynomial graphed below.



(Similar concepts to Practice Problems 10 and Exam 2)

(4) (10 Points) The graph of a rational function $y = f(x)$ has

- Vertical asymptotes at $x = -2$ and $x = 3$.
- The x-intercept at $(2, 0)$ and $(-4, 0)$.
- A horizontal asymptote of $y = \dfrac{1}{10}$.

(a) (8 Points) Find a possible formula for the rational function f.

(b) (2 Points) What is the y-intercept of $y = f(x)$ found in Part (a)?

(Similar to Practice Problems 13 and Exam 2 Problem 5)

(5) (a) (3 Points) Find the domain of $f(x) = \log(8 - 12x)$. Write your answer using interval notation.

(b) (3 Points) The value of $\ln\left(\frac{e}{e^9}\right) =$ _____.

(c) (3 Points) The value of $1000^{\log 2} =$ _____.

(Similar to Practice Assessment 13)

(6) (a) (6 Points) Solve for x:

$$5^{2x-1} = 4^{3x-6}$$

(b) (6 Points) Solve for x:

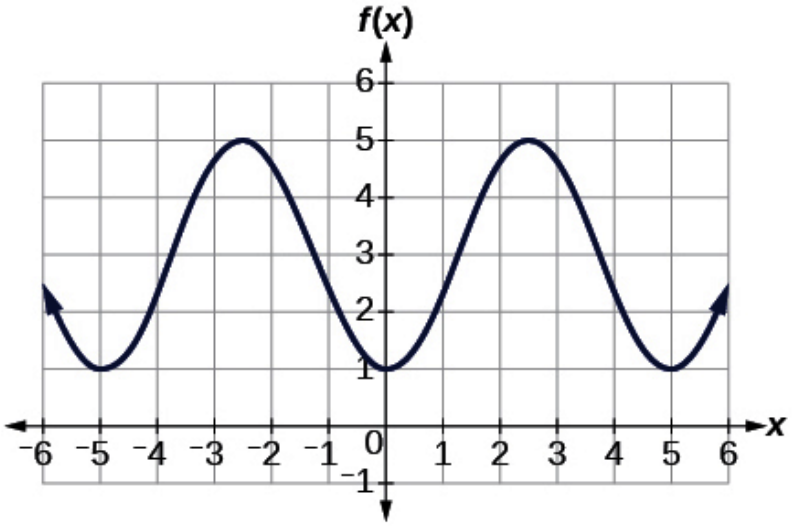
$$\log_2(x) - \log_2\left(\frac{1}{10}\right) = \log_2(x+27)$$

(Similar Practice Problems 14)

(7) (8 Points) Find a possible formula of the form

$$y = A\cos(B(x - C)) + D$$

for the sinusoidal function graphed below.



(Similar to Practice Problems 15 and Exam 3 Problem 4)

(8) (a) (4 Points) Evaluate $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ and express your answer in radians.

(b) (4 Points) Find the exact value of

$$\cos\left(\tan^{-1}\left(\frac{2}{5}\right)\right).$$

Optional Extra Credit Problem

(9) (a) (4 Points) Solve $2\sin^2(x) - 3\sin(x) + 1 = 0$ for all solutions on the interval $0 \leq x \leq 2\pi$. Your solutions must be exact.

(b) (4 Points) Use the sum or difference formula for sine

$$\sin(a \pm b) = \sin a \cos b \pm \cos a \sin b$$

to determine the exact value of $\sin\left(\frac{19\pi}{12}\right)$.