UNIVERSITY AT ALBANY
STATE UNIVERSITY OF NEW YORK

AMAT100 PreCalculus Exam 1A Fall 2024

Print Name:

UAlbany Email:

Directions: You have **80 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
1	8	
2	10	
3	10	
4	8	
5	6	
6	8	
Total	50	

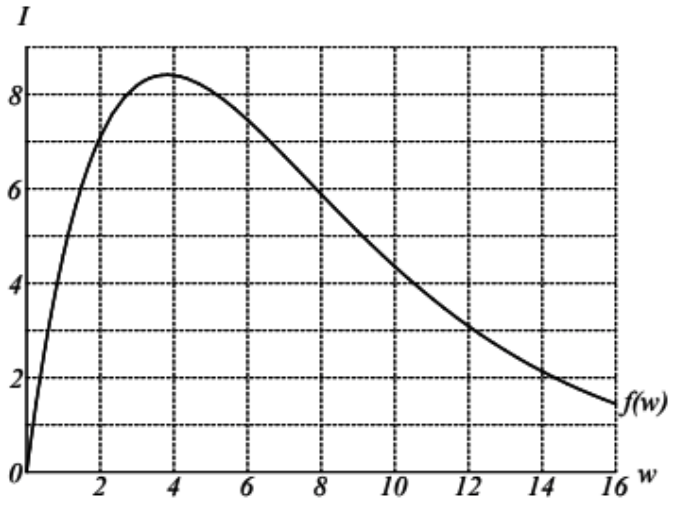
(1) (8 Points) Let

$$f(x) = \frac{1}{x+1}.$$

Evaluate and simplify the difference quotient:

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

(2) (2 Points Each) An epidemic of influenza spreads through a city. The figure below is the graph of $I = f(w)$, where I is the number of individuals (in thousands) infected w weeks after the epidemic begins.



(a) Evaluate $f(2)$.

(b) In the context of the problem, explain what $f(2)$ means.

(c) Solve $f(w) = 12$.

(d) In the context of the problem, explain what $f(w) = 12$ means.

(e) Approximately, in what week are the most people infected with influenza?

(3) (5 Points Each) Find the domain of each function below. Write your answer using interval notation.

(a) $g(z) = \dfrac{1}{(2\sqrt{z}-7)(3\sqrt{z}+1)(1-5z)}$

(b) $h(z) = \sqrt{\dfrac{3z+5}{1-3z}}$

(4) (2 Points Each) The table below gives some values of the functions f, g, and h. Here f, g, h are invertible and defined for all values of x. Additionally, $h(x) = f^{-1}(x)$.

x	$f(x)$	$g(x)$	$h(x)$
3	$\frac{3}{2}$	-5	1
-5	7	$\frac{3}{7}$	-2

Evaluate each of the following expressions, or if the given information is insufficient, write "NEI" for not enough information.

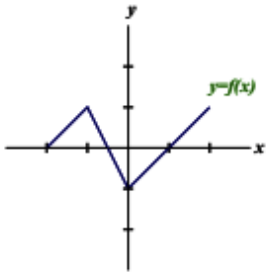
(a) $f(g(3))$=_____.

(b) $f^{-1}(7)$ =_____.

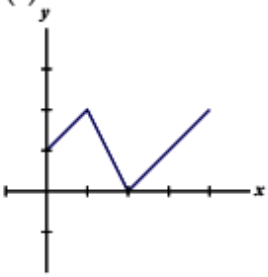
(c) $(f(-5))^{-1}$ =_____.

(d) $h(f(-5))$ =_____.

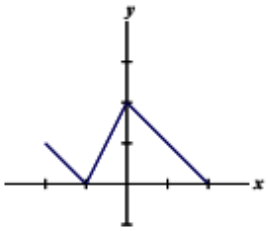
(5) The graph of $y = f(x)$ is drawn below.



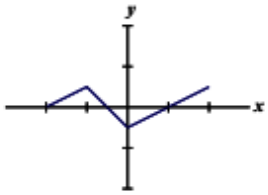
(I)



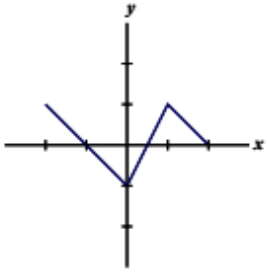
(II)



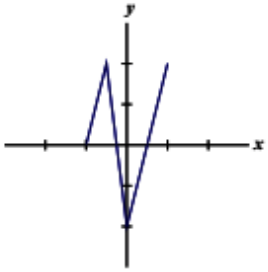
(III)



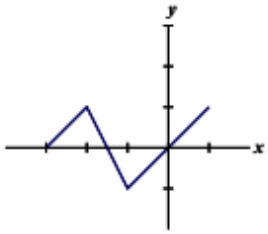
(IV)



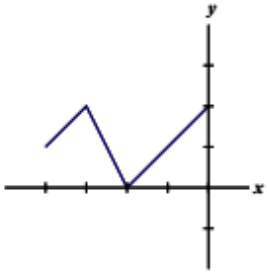
(V)



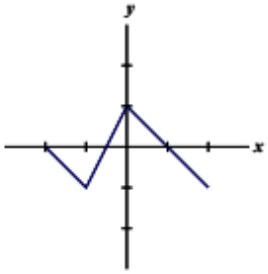
(VI)



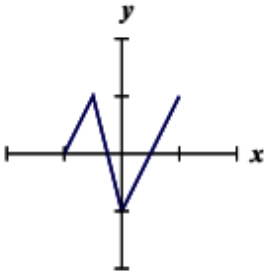
(VII)



(VIII)



(IX)



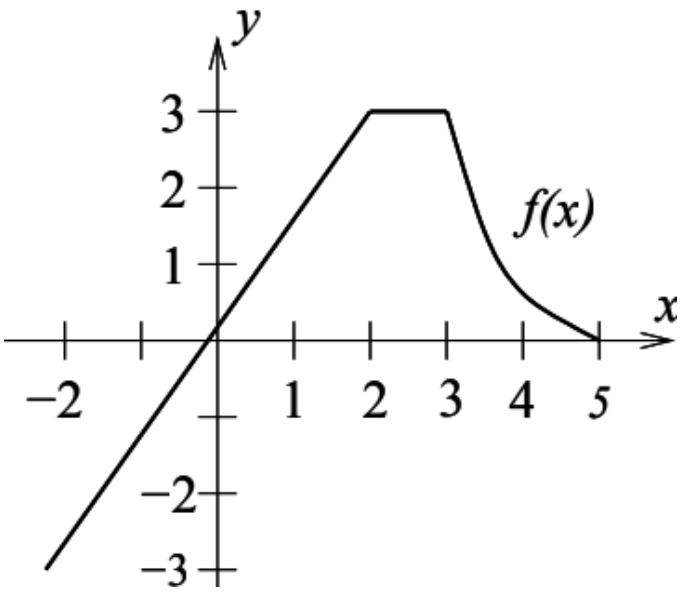
(2 Points Each) Match each formula with a graph from I-VI, or write NONE if none of these graphs represents the given formula.

(a) The graph of $y = f(x-2)+1$ is _____.

(b) The graph of $y = f(-x)$ is _____.

(c) The graph of $y = 2f(2x)$ is _____.

(6) (2 Points Each) The graph of $f(x)$ is given below on the interval $[-4, 4]$.



(a) State all of the intervals in which $f(x)$ is decreasing and positive.

(b) Find the average rate of change between $x = 2$ and $x = 5$.

(c) Give an interval for which the average rate of change zero.

(d) Which quantity is greater? The average rate of change between $x = 0$ and $x = 2$, or The average rate of change between $x = 0$ and $x = 3$.