Division of Science

Department of Mathematics

The City College
of New York

MATH195 – Precalculus

Fall 2024 Exam One - VER A Date: September 24th, 2024

First Name: _____ Last Name: _____

EMPLID: _____

Directions:

- **NO** notes, calculators, or other electronic devices allowed. *All electronic devices must be turned off and placed out of sight or they will be confiscated for the duration of the exam.*
- Read each problem carefully. Unless otherwise instructed, be sure to show your work.
- Remember that it is your *responsibility* to answer each question clearly and in a way that convinces the grader that you understand how to solve each problem.

– GOOD LUCK!

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1. (10 points) Let $P = (-4, 3)$ and $Q = (2, -6)$ be points on line l.

   (a) (2 points) Find the slope m of line l.

   Write your answer in the box below:

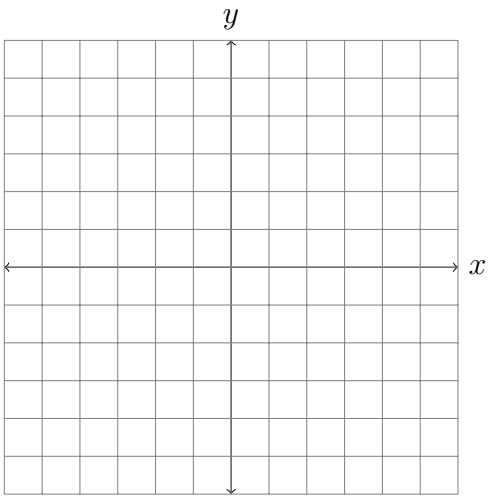
   $m =$ _____

   (b) (2 points) Find an equation of line l. You must write your equation in $y = mx+b$ form.

   Write your answer in the box below:

   $y =$ _____

   (c) (2 points) Graph line l on the grid below.



(d) (2 points) What are the x- and y-intercepts of line l. Write your answers in coordinate point form (x, y).

Write your answer in the box below:

x-intercept: _____

y-intercept: _____

(e) (2 points) Is the line $3y - 2x = -9$ parallel to line l? If YES, write yes and explain why. If NO, write no and explain why. Your explanation should be brief.

Write your answer in the box below:

_____

2. (8 points) Let $f(x) = (x + 7)^2$.

(a) (2 points) What is the domain of f? Write your answer in interval notation.

Write your answer in the box below:

Domain: _____

(b) (2 points) Restrict the domain of f such that f is one-to-one. Write your answer in interval notation.

Write your answer in the box below:

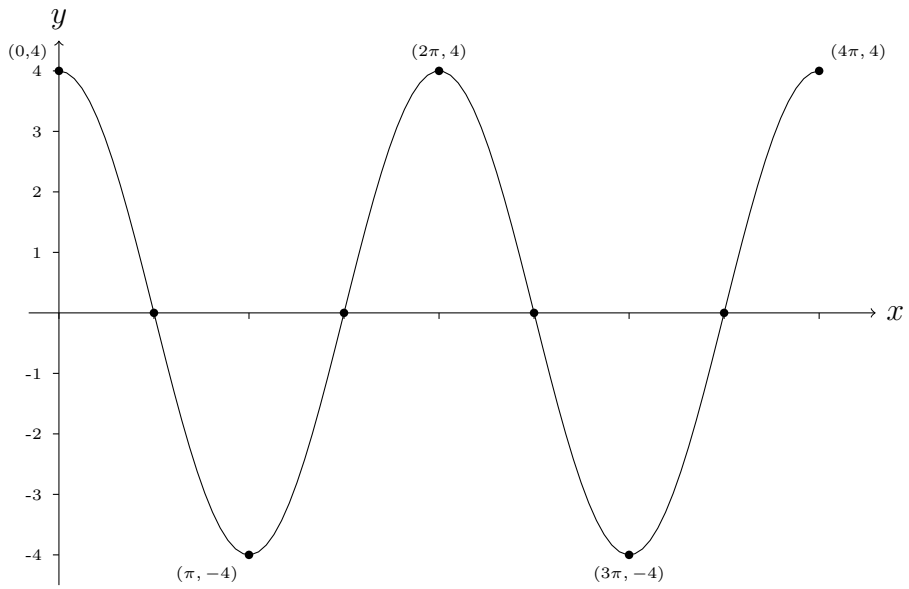
_____

(c) (4 points) Find $f^{-1}(x)$.

Write your answer in the box below:

$f^{-1}(x) =$ _____

3. (6 points) The graph of $y = f(x)$ is given below. Use the graph to answer the following questions.



xfp

(a) (2 points) What is the range of f? Write your answer using interval notation.

Write your answer in the box below:

range: _____

(b) (2 points) List the interval(s) on which f is decreasing.

Write your answer in the box below:

_____

(c) (2 points) Is there a local maximum at $x = 3\pi$? If yes, then write YES below and state what is the local maximum value.

Write your answer in the box below:

_____

4. (8 points) Find the domain of each function below. Write your answers using interval notation.

(a) (4 points) $f(x) = 2\sqrt{x+3}$

Write your answer in the box below:

Domain: _____

(b) (4 points) $h(x) = \frac{2}{\sqrt{1-2x}}$

Write your answer in the box below:

Domain: _____

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5. (10 points) For this question use the table of the function f to answer each part. Write your answers on the lines provided.

x	1	2	3	4	5	6
$f(x)$	2	3	5	1	6	3
$g(x)$	3	5	6	2	1	4

(a) (2 points) Find $(g \circ f)(2)$. _____

(b) (2 points) If $g(x) = 2$, then find x. _____

(c) (2 points) Find $f(6)$. _____

(d) (2 points) Find the average rate of change of $f(x)$ between $x = 1$ and $x = 4$. _____

(e) (2 points) If $g^{-1}(x) = 4$, then find x. _____

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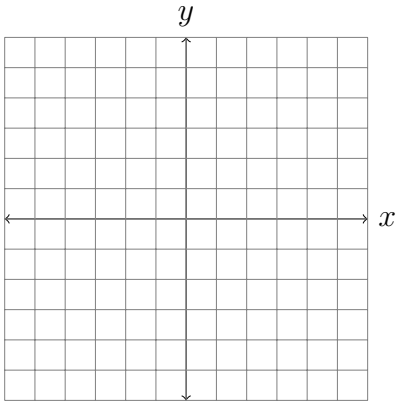
6. (8 points) Let $g(x) = x^2 + 2x - 3$.

(a) (4 points) Rewrite $g(x)$ in standard form by completing the square or you can use the formula $x = -\frac{b}{2a}$.

Write your answer in the box below:

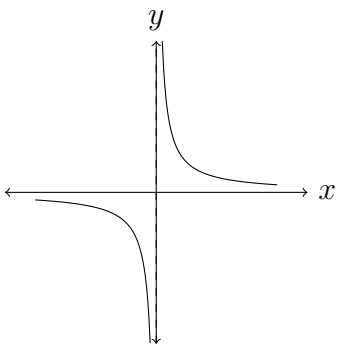
$g(x) =$ _____

(b) (4 points) Sketch the graph of $g(x) = x^2 + 2x - 3$. Label the vertex on your graph.

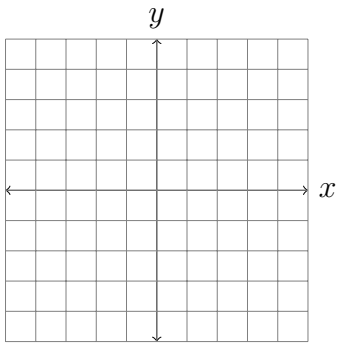


7. (6 points) Use the graph of $y = \frac{1}{x}$ (see below) to graph $g(x) = \frac{1}{x-3}$.

Graph of $y = \frac{1}{x}$:



Sketch the graph of $g(x) = \frac{1}{x-3}$ on the grid below. Clearly label the x and y intercepts and the vertical asymptote on your graph.



What is the domain of $g(x)$? Write your answer using interval notation:

Domain of $g(x)$: _____