

MATH 141 Midterm 1

February 14, 2023

NAME (please print legibly): _____

University ID Number: _____

Pledge of Honesty

I affirm that I will not give or receive any unauthorized help on this exam, and that all work will be my own.

Signature: _____

Directions

- Enter your answers where indicated in order to receive credit.
- Show your work. Unjustified answers will **not** receive credit.
- Calculators and notes are not permitted.
- If you are confused about the wording of a question or need clarification, raise your hand and **ask a proctor** about it.

1. (8 points) Find the equation of the line passing through the points $(1, 6)$ and $(-3, 22)$.

Answer:

2. (15 points) Let $f(x) = \frac{2x + 1}{7 - x}$.

(a) Find $f^{-1}(x)$.

Answer:

(b) Find the range of $f^{-1}(x)$.

Answer:

3. (12 points) Solve for x the equation

$$\log_3(4x - 2) - \log_3(4) = 2.$$

Answer:

4. (12 points) Evaluate the following expressions.

(a) $\cos^{-1}(\sqrt{3}/2)$

Answer:

(b) $\cos^{-1}(\cos(3\pi/2))$

Answer:

(c) $\csc(\tan^{-1}(\sqrt{3}))$

Answer:

5. (14 points) Consider the following equation:

$$\sin(2\theta) - 2\cos(\theta) = 0.$$

(a) Solve the equation above for θ in $[0, 2\pi)$. There may be multiple solutions. Hint: You may use the sine addition identity

$$\sin(a + b) = \sin(a)\cos(b) + \sin(b)\cos(a).$$

Answer:

(b) Solve the equation above for θ in $\left[\frac{11\pi}{2}, \frac{15\pi}{2}\right)$.

Answer:

6. (12 points) Suppose two functions f and g have the following table of values.

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

(a) Find $(g \circ f)(3)$.

Answer:

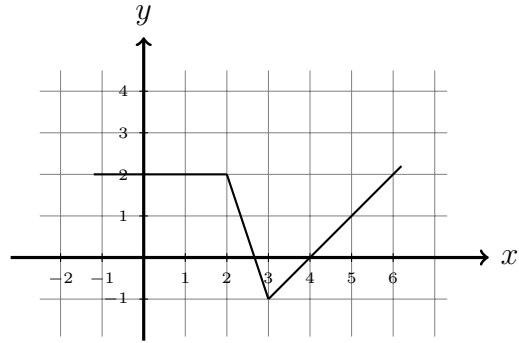
(b) Find $(f \circ g)(2)$.

Answer:

(c) Find $(g \circ f \circ f)(2)$.

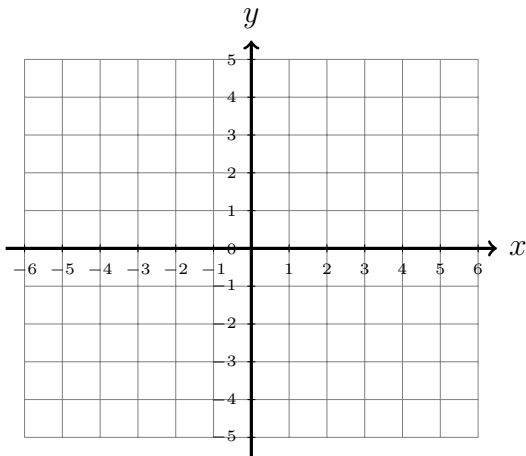
Answer:

7. (12 points) Below is the graph $y = f(x)$ for an unknown function f .

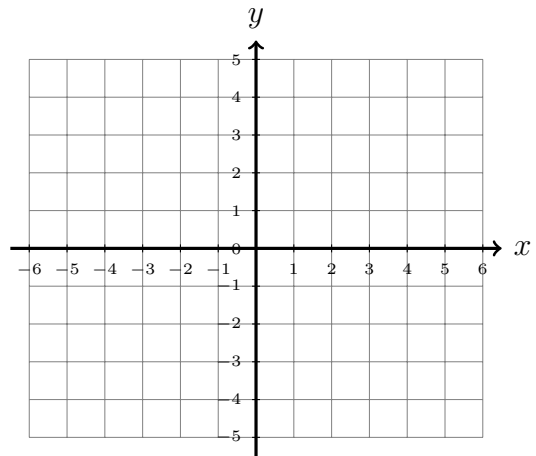


Graph the specified functions on the axes provided.

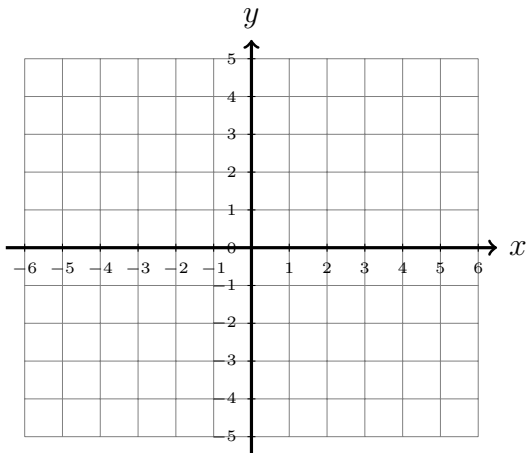
(a) $y = f(x) - 3$



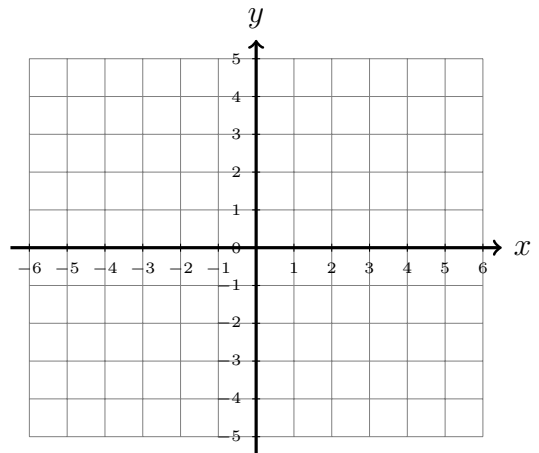
(b) $y = f(x + 3)$



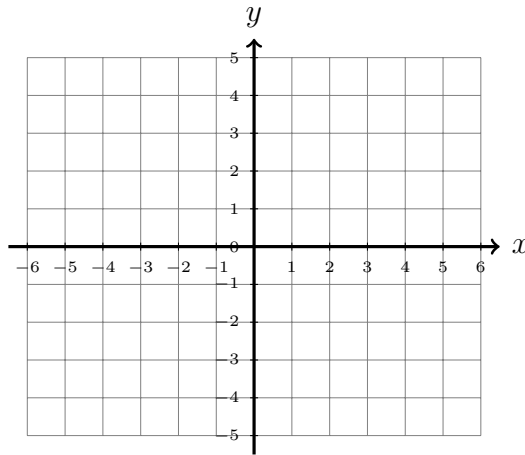
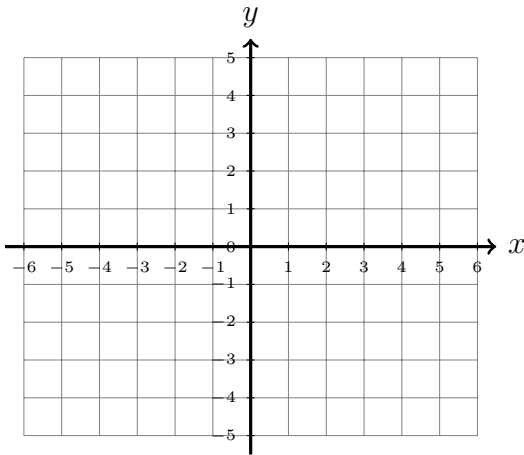
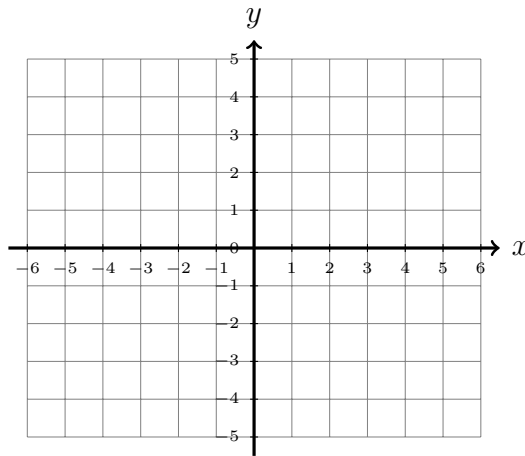
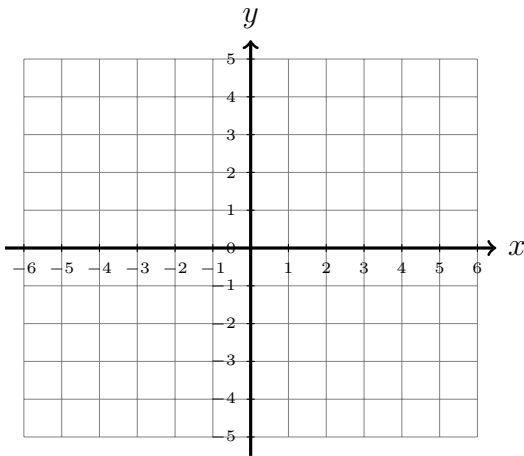
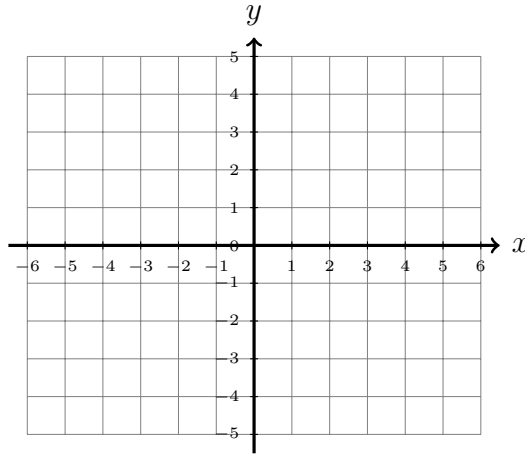
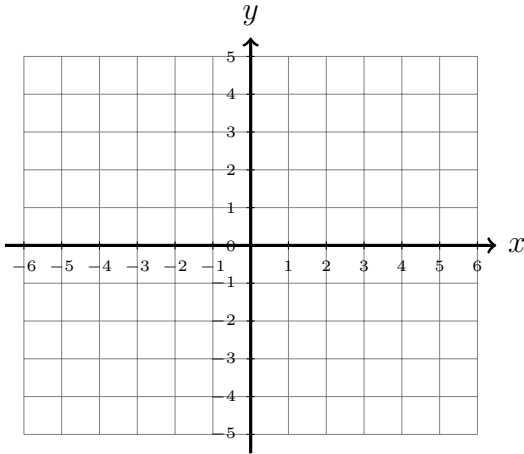
(c) $y = f(-x)$



(d) $y = |f(-x)|$



This page is provided **in case you have made errors** in pen on the previous page. Be sure to label carefully which graphs you are creating, and make a note on the previous page indicating which graphs can be found on this page instead. **If you are satisfied with your graphs on the previous page, just leave this page blank.**



8. (15 points) Define the function

$$f(x) = \begin{cases} -(3x + 4) & x < -3 \\ \sqrt{7 - 6x} & -3 \leq x \leq 1 \\ \cos(\pi x) + \ln(x) & x > 1. \end{cases}$$

For each of the following limits, determine its value or show it does not exist.

(a) $\lim_{x \rightarrow -3} f(x)$

Answer:

(b) $\lim_{x \rightarrow 1} f(x)$

Answer:

(c) $\lim_{x \rightarrow 1} |f(x)|$

Answer:

This page intentionally left blank. You may use it for scratch paper or to write solutions. If you want your work on this page to be graded, indicate on the relevant problem(s) that your work is on this page. In any case, **do not remove this page from the exam.**