

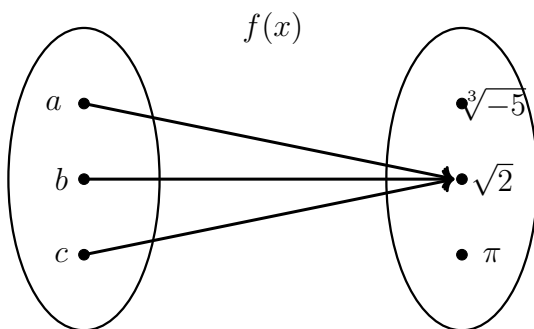
MAT 101: Exam 2
Fall – 2022
10/26/2022
60 Minutes

Name: _____

Write your name on the appropriate line on the exam cover sheet. This exam contains 11 pages (including this cover page) and 10 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

| Question | Points | Score |
|----------|--------|-------|
| 1 | 10 | |
| 2 | 10 | |
| 3 | 10 | |
| 4 | 10 | |
| 5 | 10 | |
| 6 | 10 | |
| 7 | 10 | |
| 8 | 10 | |
| 9 | 10 | |
| 10 | 10 | |
| Total: | 100 | |

1. (10 points) Suppose $f(x)$ is the relation given below.



- (a) Is $f(x)$ a function? Explain.
- (b) What is the domain of $f(x)$?
- (c) What is the codomain of $f(x)$?
- (d) What is the range of $f(x)$?

2. (10 points) Is $f(x) = \frac{1 - x^3}{x^2 + 5}$ a function? Explain.

3. (10 points) Let $f(x, y) = (x - y)^2 - x + \frac{10}{y}$. Find $f(3, -2)$ and $f(4, 5)$.

4. (10 points) Let $f(x) = 4 - x^3$ and observe that $f(2) = -4$.

(a) Is $(-1, 3)$ on the graph of $f(x)$? Explain.

(b) Is $(2, -4)$ on the graph of $f(x)$? Explain.

5. (10 points) Suppose $f(x)$ and $g(x)$ are the functions given below.

| | | | | | | | |
|--------|----|----|----|----|----|----|----|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| $f(x)$ | 0 | 5 | 4 | -1 | -5 | -1 | -3 |
| $g(x)$ | 1 | 2 | 10 | 3 | 4 | -7 | 5 |

Compute the following:

- (a) $(f - g)(-1)$
- (b) $(fg)(2)$
- (c) $(-5g)(-2)$
- (d) $(f \circ g)(0)$
- (e) $(g \circ f)(0)$

6. (10 points) Let $f(x)$ be a function such that $f^{-1}(x)$ exists. A partial table of values for $f(x)$ is given below:

| | | | | | |
|--------|----|---|---|---|----|
| x | 1 | 2 | 4 | 8 | 15 |
| $f(x)$ | -2 | 0 | 6 | 2 | 10 |

Based on the table above (or your knowledge of functions and inverses), find the following:

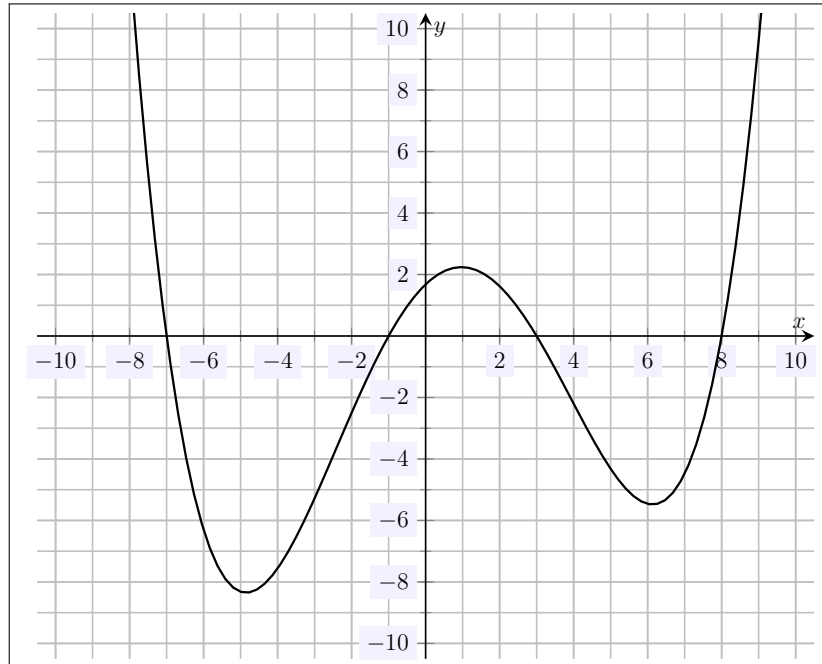
- (a) $f(2)$
- (b) $f^{-1}(2)$
- (c) $f^{-1}(f(2))$
- (d) $f(f^{-1}(\pi))$
- (e) $f^{-1}(f(\sqrt{2}))$

7. (10 points) Let $f(x) = 5 - 6x$. Assume that $f^{-1}(x)$ exists and observe that $f(2) = -7$.

(a) What is $f^{-1}(-7)$? Explain.

(b) Find $f^{-1}(17)$.

8. (10 points) A graph of a relation $f(x)$ is shown below:



Using the graph above, answer the following:

- (a) Is the relation $f(x)$ a function? Explain.
- (b) Does the relation $f(x)$ have an inverse function? Explain.

9. (10 points) Let $f(x) = \frac{7-x}{2}$ and $g(x) = 7-2x$. Show that $g(x)$ is the inverse of $f(x)$.

10. (10 points) Let $f(x) = 5x - 4$. Find $f^{-1}(x)$.