

MATH 111 - Exam One - Fall 2021

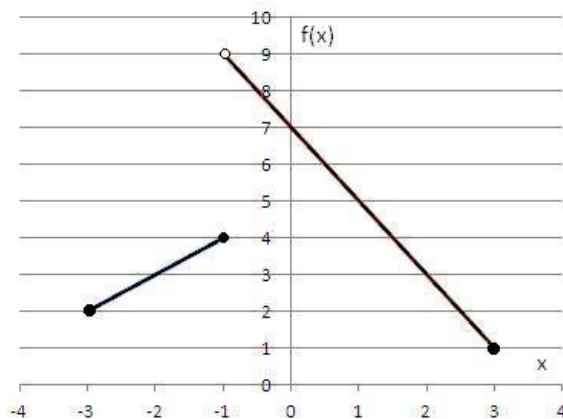
1. [10pts] Simplify the expression $(x + 2)(x^2 - 3x + 1) - 2(x^3 - 3x + 1)$.

2. [12pts] Solve the inequality $2 \leq 4 - \frac{1}{3}x < 5$. Give your answer using interval notation.

3. [12pts] Simplify the rational product below as much as possible.

$$\frac{r^2 - 3r - 10}{r^2 - 1} \div \frac{r + 2}{r^2 - r - 2}$$

4. Below is the graph of a function $f(x)$ with domain $[-3, 3]$. Answer the questions below the graph:



4a. [2pts] What is the value of $f(0)$?

4b. [2pts] What is the value of $f(-1)$?

4c. [6pts] Find all solutions to the equation $f(x) = 3$.

4d. [6pts] Use interval notation to describe all values y for which the equation $f(x) = y$ has exactly one solution.

5a. [6pts] Find the equation for the line passing through the points (2, 2) and (5, 6).

5b. [6pts] For the line from (5a) find the exact values of the coordinates of the points where this line intersects the x-axis and the y-axis and find the exact value of the distance between those two points.

6. [14pts] Find the center and radius of the circle given by the equation

$$x^2 + y^2 + 7y + 10 = 0$$

Give your answers as exact values.

7. [12pts] For what values of C does the quadratic equation $2x^2 - 3x + C = 0$ not have any real-valued solutions? Give your answer as an inequality.

8. [12pts] Sketch a graph of the piecewise-defined function

$$f(x) = \begin{cases} 2x + 1 & \text{if } x \leq 1 \\ x^2 & \text{if } x > 1 \end{cases}$$