W2210701

MATH 1070 FINAL EXAM – WINTER 2022

SHOW ALL WORK. DO NOT USE A CALCULATOR.

Each problem is worth 10 points.

1) Write a slope-intercept equation for a line passing through the point (0, 4) that is perpendicular to $3x - 4y = 5$.

2) Given the function $f(x) = \begin{cases} 3x+5 & \text{for } x \le -4 \\ 2 & \text{for } -4 < x \le 1 \\ |x-3| & \text{for } x > 1 \end{cases}$, find the following:

   a. $f(-4)$

   b. $f(2)$

3) Given $f(x) = 2x^2 + 2$ and $g(x) = \frac{3}{x}$, find:

   a) $(f - g)(-3)$

   b) $(g \circ f)(1)$

   c) $(f \circ f)(x)$

4) Construct and simplify the difference quotient for $f(x) = 5 - 2x^2$.

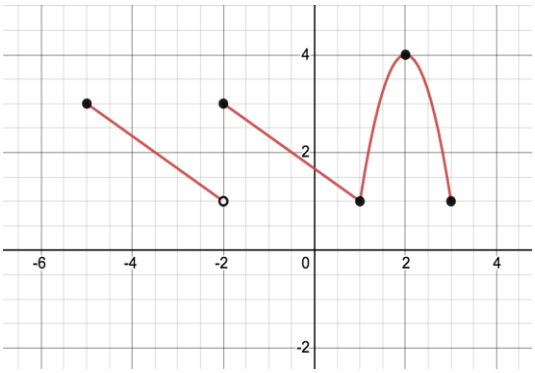
5) For the given graph of the function $f(x)$, find:

   a) The domain of $f(x)$

   b) The intervals where $f(x)$ is decreasing

   c) $f(-2)$

   d) All values for x such that $f(x) = 1$



6) Find the domain of the following function: $f(x) = \frac{x+1}{x^2-9x}$

7) Solve: $\sqrt{x-1} = x - 7$

8) Solve: $3|x-2| - 10 = 11$

9) Solve $\log_2(3-5x) = 2 + \log_2(x+3)$.

10) Solve, writing any non-real solutions in the form $a + bi$: $x^2 - 6x + 11 = 1$

11) Find the dimensions of a rectangular rug whose perimeter is 36 ft. and whose area is 80 ft^2.

12) Describe how the graph of $y = |x - 2| - 1$ can be obtained from the graph of $y = |x|$ using transformations. Then graph $y = |x - 2| - 1$.

13) Solve: $t^{\frac{1}{2}} - 4t^{\frac{1}{4}} = -3$

14) Given $g(x) = -x^2 + 8x - 12$

a. Find the vertex by completing the square.

b. Graph the function labeling the vertex and all x- and y-intercepts.

15) Solve $\frac{x-4}{x+2} \geq 0$.

16) Find:

a) $\log_5 125$ b) $\log_8 \frac{1}{64}$ c) $\log_{16} 2$

17) Marcus has taken 23 college courses and has earned 75 credits. If all of his classes were either 3 or 4 credits, how many 3-credit classes and how many 4-credit classes has he taken?

18) A conic section is given by the equation $4y^2 = 16 - 4x^2$.

a. Identify the conic section.

b. Sketch the graph of the conic section. Plot and label all relevant points.

19) Solve $\frac{x+3}{x-6} = \frac{18}{x^2-10x+24}$.

20) You are designing a rectangular fish tank to fit on a shelf in your basement. The width of the fish tank is 2 feet less than the height, and the length is 8 feet more than the height.

a. Write a polynomial that would find the volume of the fish tank as a function of x.

b. If the volume of the fish tank is 96 cubic feet, what are the dimensions of the fish tank?