

QUIZ 1B**(CHAPTER 1: FUNCTIONS)****MATH 141 – SPRING 2024 – KUNIYUKI****60 POINTS TOTAL****No notes or books allowed. A scientific calculator is allowed.**

You may assume that two-dimensional graphs are in the usual Cartesian xy -plane. Give exact answers, unless you are told to approximate.

SHORTER PROBLEMS (32 POINTS)

1) (6 points). Write the domain of f , where $f(x) = \frac{\sqrt{x+2} - \sqrt[3]{x}}{x-3}$, using interval form (the form using parentheses and/or brackets).

2) (2 points). Find the x -intercept of the graph of $y = \frac{x-6}{x+7}$.

3) (1 point). The graph of $y = x^6 - 3x^2 + 5$ is symmetric about the... (Box in one:)

 x -axis y -axis

origin

(none of these)

4) (1 point). The graph of $y = \sqrt[3]{x} + \frac{1}{x}$ is symmetric about the ... (Box in one:)

 x -axis y -axis

origin

(none of these)

5) (4 points total). A function f has 2 as its only zero. Hint: Consider x -intercepts.

a) What is the only zero of g , where $g(x) = f(x - 3)$?

b) What is the only zero of h , where $h(x) = -f(x)$?

6) (1 point). Evaluate $\lceil\lceil -8.3 \rceil\rceil$. (This is the same as $\lfloor\lfloor -8.3 \rfloor\rfloor$.)

7) (4 points total). If the point $(-3, 2)$ lies on the graph of $y = f(x)$, where f is a one-to-one function, what point must then lie on the graph of ...

a) ... $y = f(x + 2) - 6$?

b) ... $y = f^{-1}(x)$?

8) (2 points). Find functions g and f such that $(f \circ g)(x) = \frac{1}{x^4 + x}$.

You may not use the identity function. Fill in the blanks:

$$g(x) = \underline{\hspace{2cm}}$$

$$f(u) = \underline{\hspace{2cm}}$$

9) (6 points). Match the equations with their corresponding graphs by writing the appropriate letters in the blanks. The x - and y -axes are not necessarily scaled the same way.

The graph of $y = \frac{1}{x}$ is Graph _____.

The graph of $y = \frac{1}{x^2}$ is Graph _____.

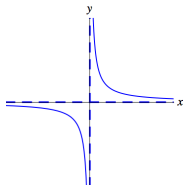
The graph of $y = |x|$ is Graph _____.

The graph of $y = \sqrt[3]{x}$ is Graph _____.

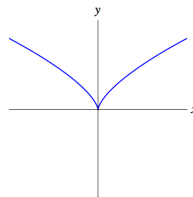
The graph of $y = x^{2/3}$ is Graph _____.

The graph of $y = \sqrt{4 - x^2}$ is Graph _____.

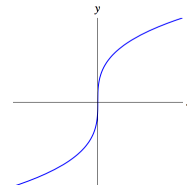
Graph A



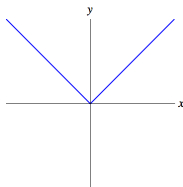
Graph B



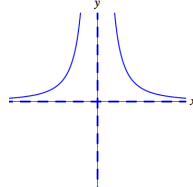
Graph C



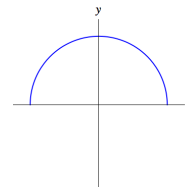
Graph D



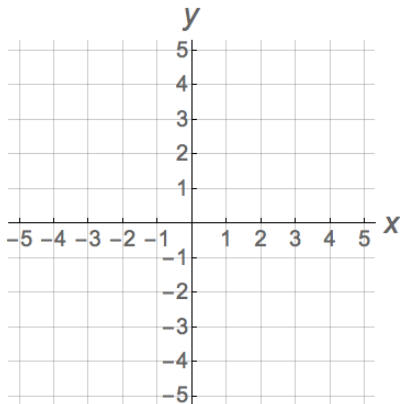
Graph E



Graph F



10) (2 points). Graph $x = y^2 + 1$ on the grid below.



11) (3 points). Let $f(x) = x^3 + 1$. What is $f^{-1}(x)$?

LONGER PROBLEMS (28 POINTS)

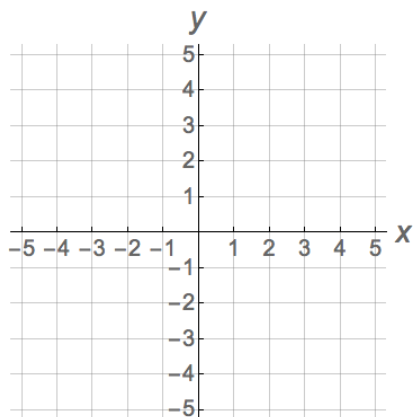
Show all work, simplify as appropriate, and use “good form and procedure” (as in class).
Box in your final answers!

12) f is a function defined piecewise by: $f(x) = \begin{cases} |x| + 1, & -3 \leq x < 1 \\ \sqrt{x}, & 1 < x < 4 \end{cases}$. (12 points)

a) Evaluate $f(0)$. (1 point)

b) Evaluate $f(1)$. (1 point)

c) Graph $y = f(x)$ on the grid below. Be accurate. Clearly indicate whether endpoints are included or excluded, as in class. (6 points)



d) Give the **domain** of f using interval form (the form with parentheses and/or brackets). (2 points)

e) Give the **range** of f using interval form (the form with parentheses and/or brackets). (2 points)

13) Let $s(t) = 2t^3 + t$. Find the average rate of change of s from $t = 3$ to $t = 6$. Assume that t is time measured in hours and $s(t)$ is the position of a particle measured in miles. (The particle is moving along a coordinate line.) Write the appropriate unit in your final answer.

Note: You are finding the average velocity of the particle between $t = 3$ hours and $t = 6$ hours. (7 points)

14) Let $f(x) = x^2 - 7x + 4$. Simplify the difference quotient completely:

$$\frac{f(x+h) - f(x)}{h}$$

(9 points)