

QUIZ 1B

(CHAPTER 1: FUNCTIONS)

MATH 141 – FALL 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) (3 points). Write the domain of f , where $f(x) = \frac{x-2}{\sqrt{x+7}} + \sqrt[3]{x}$, using interval form (the form using parentheses and/or brackets).

- 2) (2 points). If the point $(-5, 4)$ lies on the graph of $y = f(x)$, what other point must also lie on the graph if f is an **even** function?

- 3) (2 points). If the point $(-5, 4)$ lies on the graph of $y = f(x)$, what other point must also lie on the graph if f is an **odd** function?

- 4) (6 points total). If the point $(2, 3)$ 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) ... $y = f(x+4) + 3$?

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

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

5) (1 point). Evaluate $\lceil \lceil 7.9 \rceil \rceil$. (This is the same as $\lfloor \lfloor 7.9 \rfloor \rfloor$.)

6) (2 points). Find functions g and f such that $(f \circ g)(x) = (x^3 + x)^8$.

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

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

7) (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 $y = \sqrt{9 - x^2}$ is Graph _____.

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

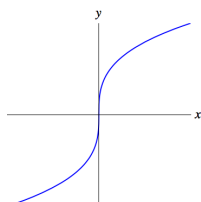
The graph of $y = \frac{1}{x}$ is Graph _____.

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

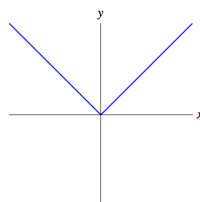
The graph of $y = \sqrt[3]{x}$ is Graph _____.

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

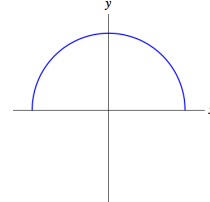
Graph A



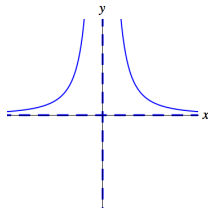
Graph B



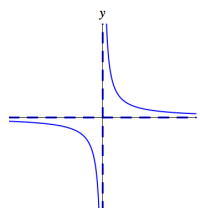
Graph C



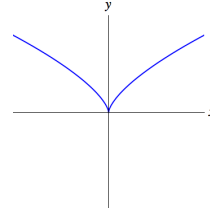
Graph D



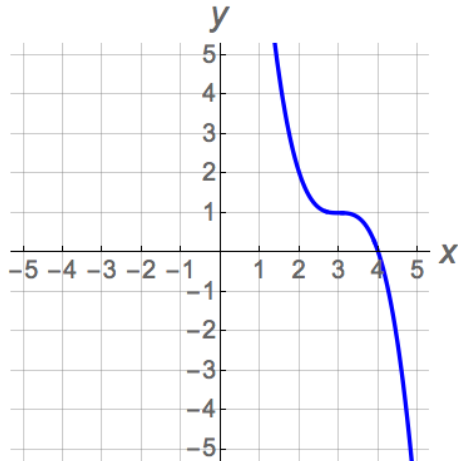
Graph E



Graph F

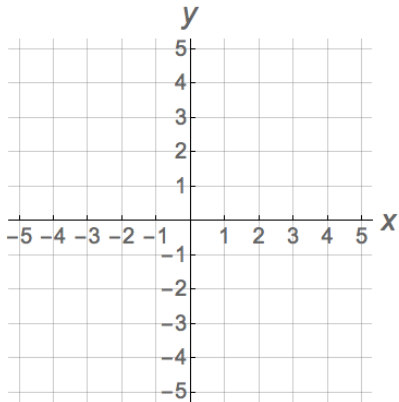


- 8) (5 points). The graph below is obtained by taking a basic graph from Section 1.3 and applying rigid transformations. Find an equation for the graph.



Fill in the blank: $y =$ _____.

- 9) (2 points). Graph $x = -y^2$ on the grid below.



- 10) (3 points). Let $f(x) = \frac{x-2}{3}$. 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!

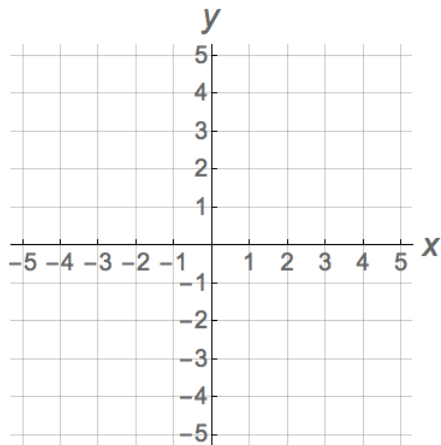
11) f is the function defined piecewise by: $f(x) = \begin{cases} 2x - 1, & x \leq 2 \\ 2 - x, & x > 2 \end{cases}$. (12 points)

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

b) Evaluate $f(2)$. (1 point)

c) Evaluate $f(3)$. (1 point)

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



e) Give the **domain** of f using interval form (the form with parentheses and/or brackets). (1 point)

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

12) Let $s(t) = t^2 + 3t - 4$. Find the average rate of change of s from $t = 2$ to $t = 7$. 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 $t = 2$ hours and $t = 7$ hours. (7 points)

13) Let $f(x) = \frac{3}{x}$. Simplify the difference quotient completely: (9 points)

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