

**QUIZ 1B**

(CHAPTER 1: FUNCTIONS)

MATH 141 – FALL 2021 – 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 (31 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) (4 points). 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  $h(x) = -f(x)$ ?
  
- 5) (1 point). Evaluate  $\lceil\lceil -8.3 \rceil\rceil$ . (This is the same as  $\lfloor\lfloor -8.3 \rfloor\rfloor$ .)
  
- 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) (2 points). If the point  $(3, -5)$  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  $y = f^{-1}(x)$ ?

8) (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 \_\_\_\_.

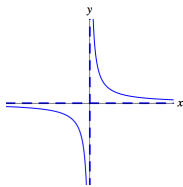
The graph of  $y = |x|$  is Graph \_\_\_\_.

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

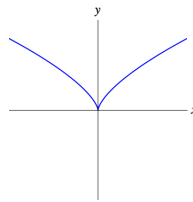
The graph of  $y = x^{2/3}$  is Graph \_\_\_\_.

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

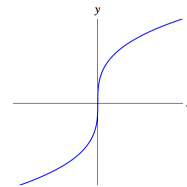
Graph A



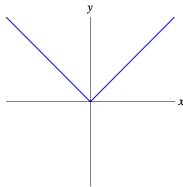
Graph B



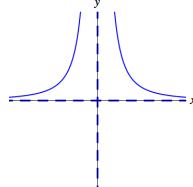
Graph C



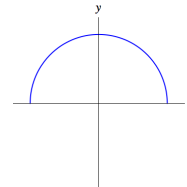
Graph D



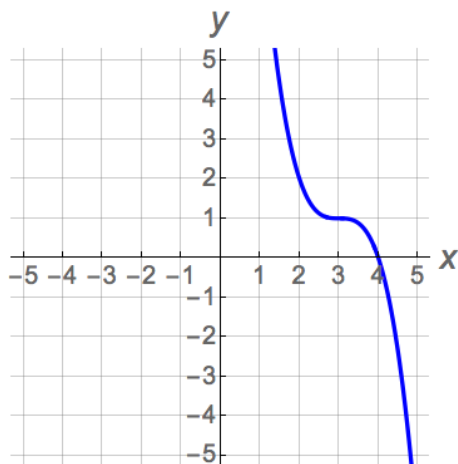
Graph E



Graph F

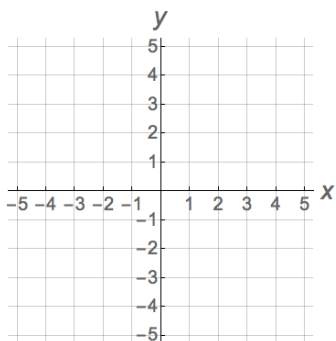


9) (5 points). The graph below is obtained by taking a basic graph from Section 1.3 and applying rigid transformations. Find an equation for the graph.



Fill in the blank:  $y =$  \_\_\_\_\_.

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



11) (2 points). Let  $f(x) = x^3 + 1$ . What is  $f^{-1}(x)$ ?

### LONGER PROBLEMS (29 POINTS)

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).

Box in your final answers!

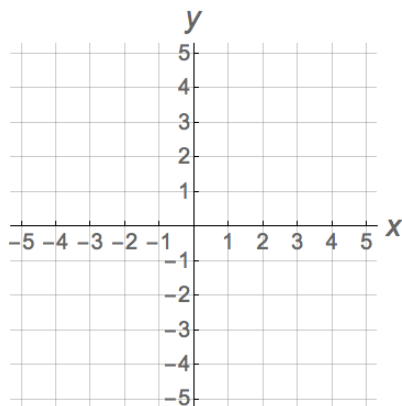
12)  $f$  is the function defined piecewise by:  $f(x) = \begin{cases} 2x - 1, & x \leq 2 \\ 2 - x, & x > 2 \end{cases}$ . (12 points)

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)

- 13) 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)

- 14) Let  $f(x) = \frac{3}{x}$ . Simplify the difference quotient completely: (10 points)

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