

**QUIZ 1B**

(CHAPTER 1: FUNCTIONS)  
 MATH 141 – SPRING 2020 – 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 (30 POINTS)**

- 1) (4 points). Write the domain of  $f$ , where  $f(x) = \frac{1}{\sqrt{x+3}} + \sqrt[3]{x-7}$ , 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) (2 points). The graph of  $y = 2x^5 + 3x^3 - x$  is symmetric about ... (Box in one:)  
 the  $x$ -axis                  the  $y$ -axis                  the origin                  (none of these)
- 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) (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) ...  $y = f^{-1}(x)$ ?

7) (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?

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:

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

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

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

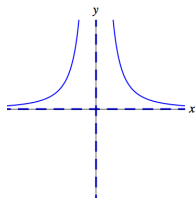
The graph of  $y = \frac{1}{x}$  is Graph \_\_\_\_\_.

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

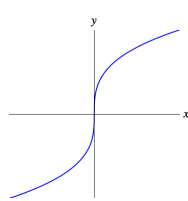
The graph of  $y = |x|$  is Graph \_\_\_\_\_.

The graph of  $y = \sqrt{49 - x^2}$  is Graph \_\_\_\_\_.

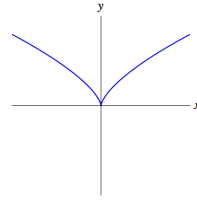
Graph A



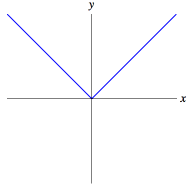
Graph B



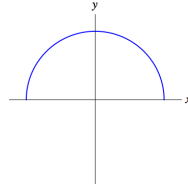
Graph C



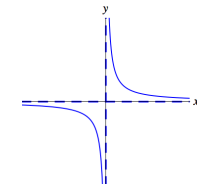
Graph D



Graph E

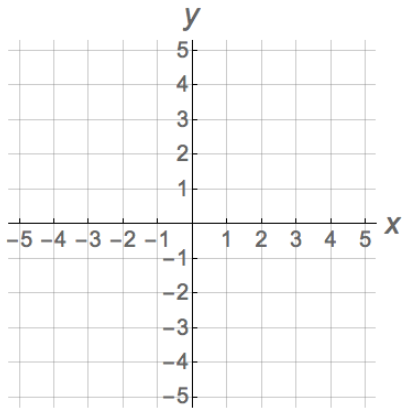


Graph F



10) (1 point). Let  $f(x) = x + 4$ . What is  $f^{-1}(x)$ ?

11) (2 points). Graph  $x = y^2 + 1$  on the grid below.



**LONGER PROBLEMS (30 POINTS)**

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

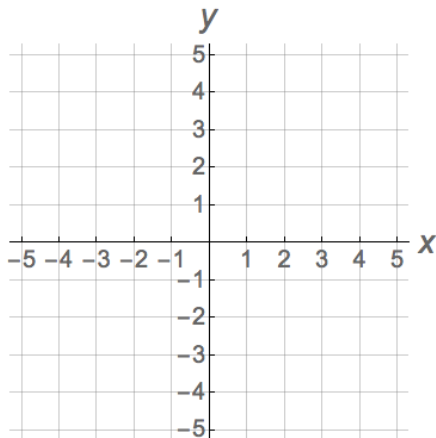
12)  $f$  is the function defined piecewise by:  $f(x) = \begin{cases} |x| + 1, & -3 \leq x < 1 \\ \sqrt{x}, & 1 < x < 4 \end{cases}$

(13 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. (7 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:

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

(10 points)