

**QUIZ 1B**

(CHAPTER 1: FUNCTIONS)  
 MATH 141 – FALL 2017 – 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 (24 POINTS TOTAL)**

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

(Box in one:)

$x$ -axis

$y$ -axis

origin

(none of these)

3) (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  $h(x) = -f(x)$ ?

4) (1 point). Evaluate  $\lceil\lceil -8.3 \rceil\rceil$ . (This is the same as  $\lfloor\lfloor -8.3 \rfloor\rfloor$ .)

5) (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:

$g(x) =$  \_\_\_\_\_  $f(u) =$  \_\_\_\_\_

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

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

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

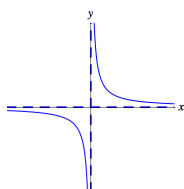
The graph of  $y = |x|$  is Graph \_\_\_\_\_.

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

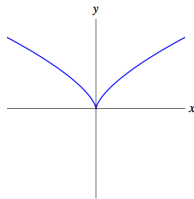
The graph of  $y = x^{2/3}$  is Graph \_\_\_\_\_.

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

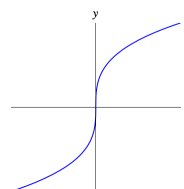
Graph A



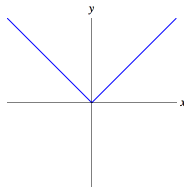
Graph B



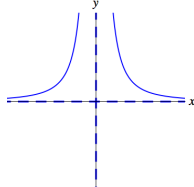
Graph C



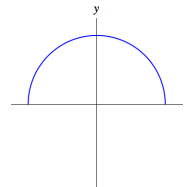
Graph D



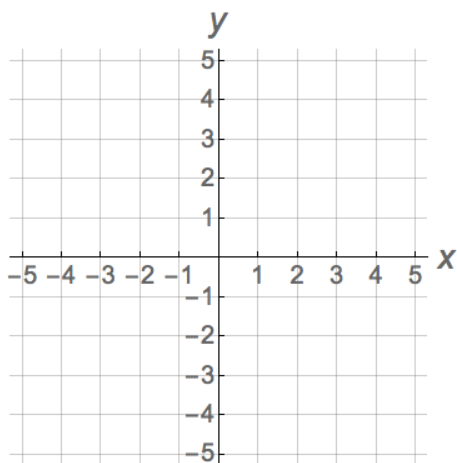
Graph E



Graph F



8) (2 points). Graph  $x = y^2 - 2$  on the grid below.



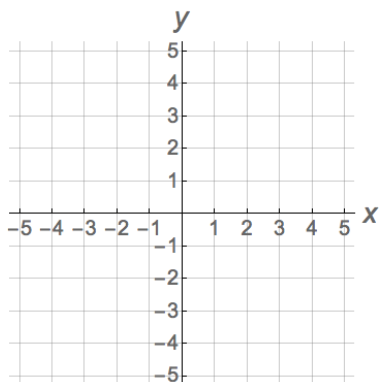
### LONGER PROBLEMS (36 POINTS)

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

Box in your final answers!

9) Let  $g(x) = |x + 2| + 1$  for parts a) and b) below. (7 points total)

a) Graph  $y = g(x)$  on the grid below. Be as accurate as possible. (5 points)



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

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

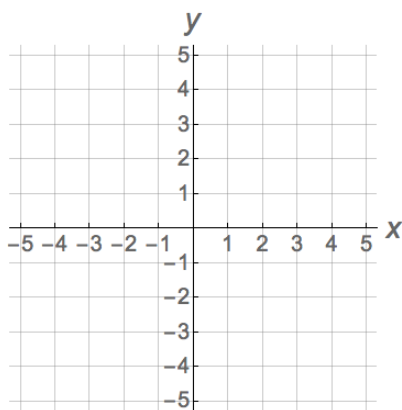
a) Evaluate  $f(-1)$ . (1 point)

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

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

d) Graph  $y = f(x)$  on the grid below. Be as accurate as possible.

Clearly indicate whether endpoints are included or excluded. (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)

- 11) 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)

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

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