

**QUIZ 1B**

(CHAPTER 1: FUNCTIONS)  
 MATH 141 – SPRING 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 (25 POINTS TOTAL)**

- 1) (4 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) (1 point). The graph of  $y = \frac{1}{x^4} - x^6$  is symmetric about ... (Box in one:)  
 the  $x$ -axis                  the  $y$ -axis                  the origin                  (none of these)
- 3) (1 point). The graph of  $y = x^7 + 1$  is symmetric about ... (Box in one:)  
 the  $x$ -axis                  the  $y$ -axis                  the origin                  (none of these)
- 4) (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) ...  $y = f^{-1}(x)$ ?
- 5) (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:  
 $g(x) =$  \_\_\_\_\_                   $f(u) =$  \_\_\_\_\_

- 6) (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 \_\_\_\_\_.

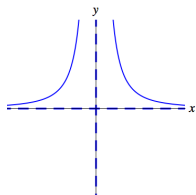
The graph of  $y = \frac{1}{x}$  is Graph \_\_\_\_\_.

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

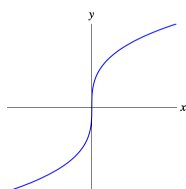
The graph of  $y = |x|$  is Graph \_\_\_\_\_.

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

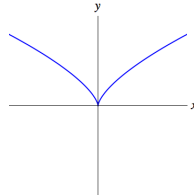
Graph A



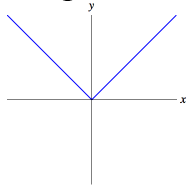
Graph B



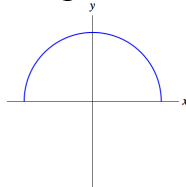
Graph C



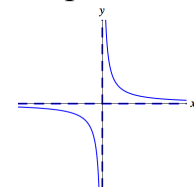
Graph D



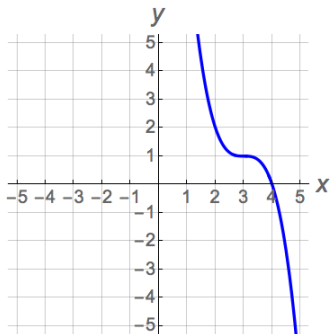
Graph E



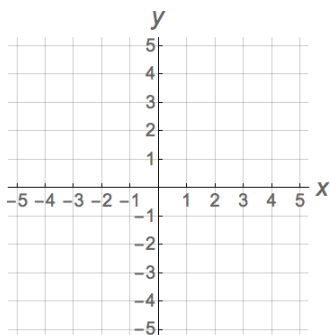
Graph F



- 7) (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.



- 8) (2 points). Graph  $x = y^2 + 1$  on the grid below.



### LONGER PROBLEMS (35 POINTS TOTAL)

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

Box in your final answers!

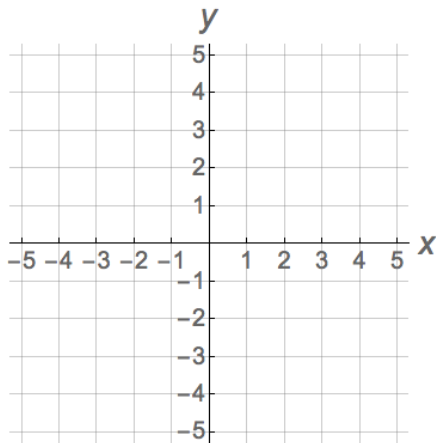
- 9) Find **and box in** the  $x$ -intercept[s] (if any) of the graph of  $y = \sqrt{\frac{3x^2 - 8x + 2}{x - 5}}$  in the usual  $xy$ -plane. If there are none, write “NONE”. (7 points)

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

a) Evaluate  $f(-2)$ . (1 point)

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

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



- d) Give the **domain** of the function  $f$  using interval form (the form with parentheses and/or brackets). (1 point)
- e) Give the **range** of the function  $f$  using interval form (the form with parentheses and/or brackets). (2 points)

- 11) 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)

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

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

(10 points)