Math 141 Name: _____

QUIZ 1B

(CHAPTER 1: FUNCTIONS)
MATH 141 – FALL 2022 – 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 (23 POINTS)

1) (3 points). Write the domain of f, where $f(x) = \dfrac{x-2}{\sqrt{x+7}} + \sqrt[3]{x}$, using interval form (the form using parentheses and/or brackets).

2) (2 points total). Box in the appropriate answers.

a) The graph of $y = x^5 - 2x$ in the usual *xy*-plane is symmetric about …
the *x*-axis the *y*-axis the origin (none of these)

b) If $g(t) = t^{2/3} + 5$, then g is …
even odd neither

3) (1 point). Evaluate $[\![-4.2]\!]$. (This is the same as $\lfloor -4.2 \rfloor$.)

4) (6 points total). If the point $(5, 2)$ 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) … $y = f(x+3) - 1$?

b) … $y = -f(x)$?

c) … $y = f^{-1}(x)$?

5) (2 points). Find functions g and f such that $\left(f \circ g\right)\left(x\right) = \dfrac{1}{x-3}$.

You may <u>not</u> use the identity function. Fill in the blanks:

$g\left(x\right) =$_____ $f\left(u\right) =$_____

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 _____.

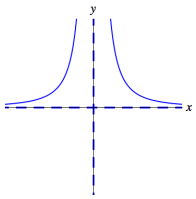
The graph of $y = \dfrac{1}{x}$ is Graph _____.

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

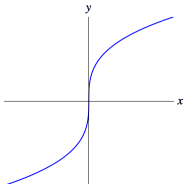
The graph of $y = \left| x \right|$ is Graph _____.

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

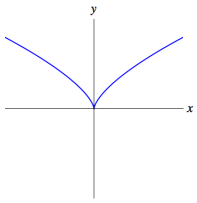
Graph A



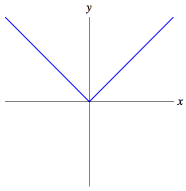
Graph B



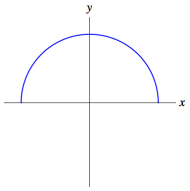
Graph C



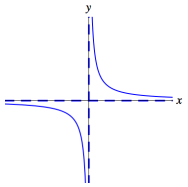
Graph D



Graph E

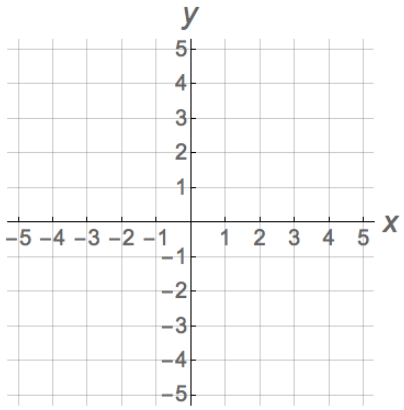


Graph F



7) (1 point). Let $f\left(x\right) = x + 4$. What is $f^{-1}\left(x\right)$?

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



LONGER PROBLEMS (37 POINTS)

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

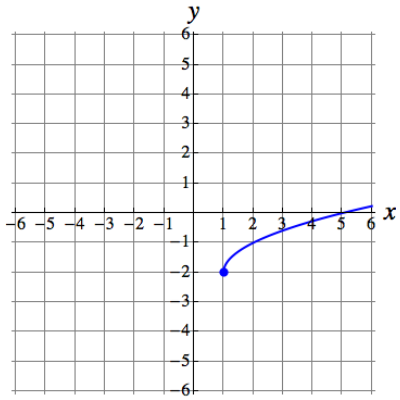
9) Let $f(x) = \dfrac{2-x}{3x^2-5x-2}$. Parts a), b), and c) below use this. (8 points total)

a) Simplify: $\dfrac{2-x}{3x^2-5x-2}$. (4 points)

b) Find **and box in** the x-intercept(s) (if any) of the graph of $y = f(x)$. If there are none, write "NONE." (2 points)

c) Find **and box in** the y-intercept (if any) of the graph of $y = f(x)$. If there is none, write "NONE." (2 points)

10) Fill in the blank: The graph below has equation $y =$ _____.
Hint: The graph is obtained by translating a basic graph from class. (4 points)



11) Let $s(t) = 2t^3 + 7t$. Find the average rate of change of s from $t = -3$ to $t = 4$. Assume that t is time measured in seconds and $s(t)$ is the position of a particle measured in meters. (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 $t = -3$ seconds and $t = 4$ seconds; we are allowing negative values for t. (6 points)

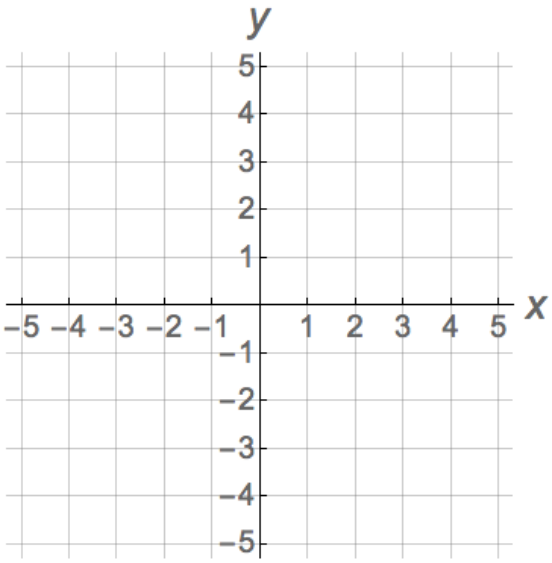
12) f is the function defined piecewise by: $f(x)=\begin{cases}3x+2, & -2\le x<0\\ (x-1)^2, & x\ge 0\end{cases}$

(10 points)

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

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

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



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

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

13) Let $f(x) = x^2 - 7x + 4$. Simplify the difference quotient completely: (9 points)

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