

QUIZ 1B

(CHAPTER 1: FUNCTIONS)

MATH 141 – FALL 2023 – KUNIYUKI

60 POINTS TOTAL

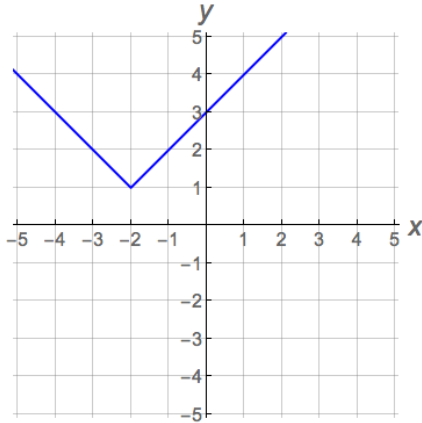
No notes or books allowed. A scientific calculator is allowed.

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 (32 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) (3 points). Find **and box in** the x -intercept(s) (if any) of the graph of $y = \frac{\sqrt{x^2 - 25}}{x - 5}$ in the usual xy -plane. If there are none, write “NONE.”
- 3) (1 point). 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) (1 point). 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?
- 5) (6 points total). If the point $(1, -5)$ 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 ...
- a) ... $y = f(x - 1) + 4$?
- b) ... $y = -f(x)$?
- c) ... $y = f^{-1}(x)$?

- 6) (4 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: $y =$ _____.

- 7) (1 point). Evaluate $\lceil\lceil -7.1 \rceil\rceil$. (This is the same as $\lfloor\lfloor -7.1 \rfloor\rfloor$.)

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

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

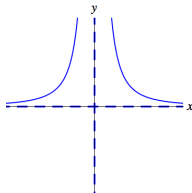
The graph of $y = \frac{1}{x}$ is Graph _____.

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

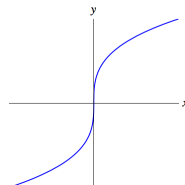
The graph of $y = |x|$ is Graph _____.

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

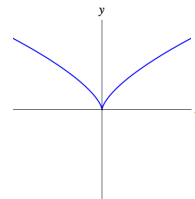
Graph A



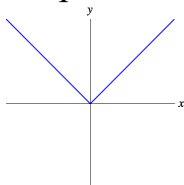
Graph B



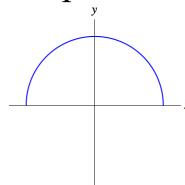
Graph C



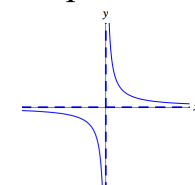
Graph D



Graph E



Graph F

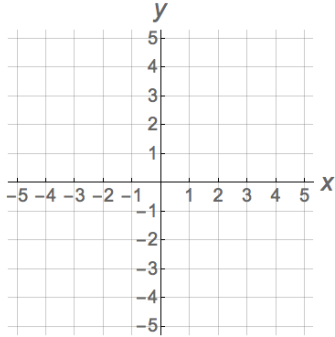


9) (2 points). Find functions g and f such that $(f \circ g)(x) = \sqrt[3]{x^2 + 1}$.

You may not use the identity function. Fill in the blanks:

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

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



11) (2 points). Let $f(x) = \sqrt[3]{x+4}$. What is $f^{-1}(x)$?

LONGER PROBLEMS (28 POINTS)

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

Box in your final answers!

12) Let $s(t) = t^3 - 2t$. Find the average rate of change of s from $t = 1$ 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 $t = 1$ second and $t = 4$ seconds. (7 points)

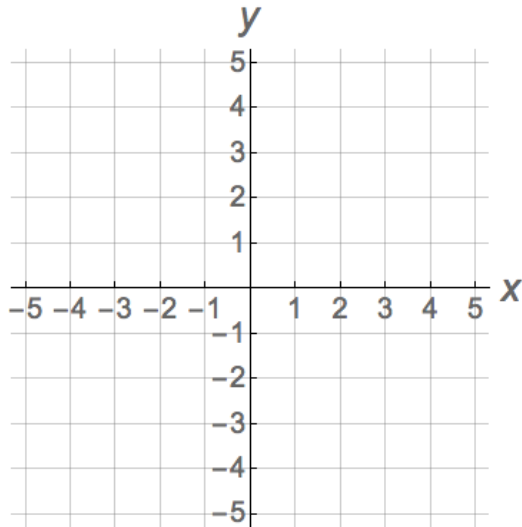
13) f is the function defined piecewise by: $f(x) = \begin{cases} x^2 - 1, & -2 \leq x < 2 \\ 1 - x, & x \geq 2 \end{cases}$. (12 points)

a) Evaluate $f(-3)$. (1 point)

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

c) Evaluate $f(2)$. (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 the function f using interval form (the form with parentheses and/or brackets). (1 point)

f) Give the **range** of the function f using interval form (the form with parentheses and/or brackets). (2 points)

14) Let $f(x) = \sqrt{x}$. Simplify the difference quotient completely:

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

Hint: You will need to rationalize a numerator. (9 points)