

Math 101 Benchmark 1

February 23, 2023

Name: _____ Student ID: _____

Indicate your section/instructor.

- | | |
|--|--|
| <input type="checkbox"/> 001 Daniel Welchons | <input type="checkbox"/> 003 Yuhao Mu |
| <input type="checkbox"/> 007 Amanda Rowley | <input type="checkbox"/> 008 Dakota White |
| <input type="checkbox"/> 009 Taylor Murray | <input type="checkbox"/> 101 Sam Macdonald |

101

Answer the questions in the spaces provided on the question sheets. Show an appropriate amount of work (including appropriate explanation) for each problem, so that graders can see not only your answer but also how you obtained it. Include units in your answer when possible. You may receive 0 points for a problem where you show no work.

Instructions:

1. Do not open this exam until you are told to do so.
2. Write your initials on every page!
3. No books or notes may be used on the exam.
4. You may only use an *approved* calculator on the exam. If you have a problem with your calculator, raise your hand.
5. Read and follow directions carefully.
6. All cell phones must be turned off and put away during the exam. Any device that connects to a phone or the web must be removed and put away.
7. Do not separate the pages of this exam. If they do become separated, point this out to your instructor when you hand in the exam.
8. Make sure your answer is clearly marked.
9. Credit or partial credit will be given only when the appropriate explanation and/or work is shown.
10. This exam has 8 questions, for a total of 60 points. There are 7 pages besides this one.
11. You will have 90 minutes to complete the exam.
12. If you use graphs or tables to find an answer, be sure to include an explanation and sketch of the graph, and to write out the entries of the table that you use.

You can use this page for scratch work.

1. Answer the following questions about the table below:

x	0	1	2	3	4	5
h(x)	-3	-2	-1	4	6	-1

(a) (3 points) Does the table represent a function? **Explain** your answer in a sentence or two.

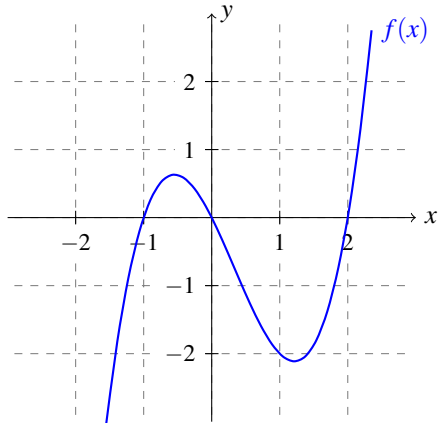
(b) (5 points) Evaluate the following:

$h(0) =$
 $h(h(3)) =$
 $h^{-1}(-2) =$

(c) (2 points) Solve for x when $h(x) = 6$?

$x =$

2. Below is a graph of a function $f(x)$:



(a) (2 points) **Evaluate** $f(-1)$ and $f(1)$?

$f(-1) =$

$f(1) =$

(b) (4 points) Compute the average rate of change of $f(x)$ on the interval $x = -1$ to $x = 1$. Write your **final answer** in the box below, and be sure to **show all work** to receive credit.

Average Rate of Change =

Initials: _____

3. Suppose that Buzz makes custom glass vases and that the cost, in Dollars, of ordering a vase from Buzz with a radius of r inches is $C(r) = 8.5r + 15$.

(a) (3 points) Find and interpret $C(12)$ within the context of this problem.

(b) (3 points) Suppose that the smallest vases that Buzz makes have a radius of 1 inch and the largest have a radius of 12 inches. Based on this information what is the domain of $C(r)$?

(c) (3 points) Notice that the range of $C(r)$ is the interval $[23.5, 117]$. Interpret the range of $C(r)$ in the context of the problem. Be sure to include the specific values and the units.

Initials: _____

4. This problem involves equations of lines. Be sure to **show all work** on all parts to receive credit.

(a) (2 points) Find the equation of line A , which passes through the points $(1, 2)$ and $(6, -3)$.

(b) (2 points) Find the equation of line B , which has slope $\frac{3}{4}$ and passes through the point $(12, 6)$.

(c) (2 points) Find a line which is perpendicular to line B and has y -intercept of $y = 3$.

(d) (3 points) Where do the lines $y = x - 2$ and $y = \frac{1}{3}x - 5$ intersect? Give the (x, y) -coordinates of the point where these lines intersect. Write your **final answer** in the box below, and be sure to **show all work** to receive credit.

Point of
Intersection =

Initials: _____

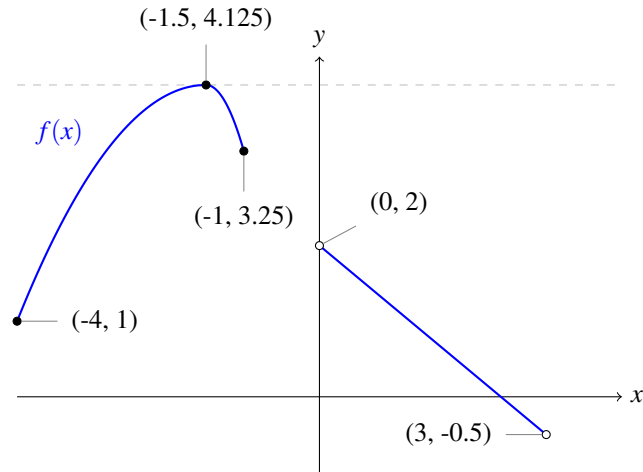
5. Suppose that the dark lord Sauron has a jewelry store specializing in rings which he sells for \$525 each. He leases his space for \$3000 every month and each ring costs him \$150 to make.

(a) (3 points) Write a function $C(r)$ which gives Sauron's expenses for a month in which he sells r rings.

(b) (3 points) Interpret the meaning of $C(9) = 4350$. Include units in your answer.

(c) (3 points) Note that the revenue Sauron makes each month is $R(r) = 525r$. How many rings does Sauron need to sell so that his revenue equals his cost?

6. Below is a graph of a function $f(x)$ with some (x,y) -coordinate points labeled:



(a) (2 points) What is the domain of $f(x)$?

Domain of $f(x)$:

(b) (2 points) What is the range of $f(x)$?

Range of $f(x)$:

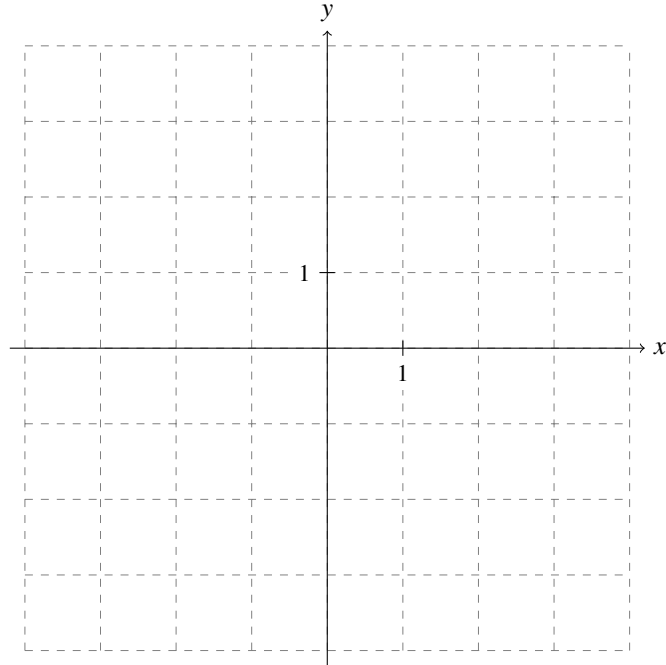
7. (3 points) Consider the function $g(x) = \sqrt{x-4}$. What is the domain of $g(x)$?

Domain of $g(x)$:

8. Consider the function

$$f(x) = \begin{cases} -3 & x < -2 \\ x+2 & -2 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$$

(a) (4 points) **Draw a graph of the function $f(x)$ on the grid below.**



(b) (2 points) Find $f(-2)$ and $f(2)$.

$f(-2) = \boxed{}$

$f(2) = \boxed{}$

(c) (4 points) Suppose that $g(x) = x^2 - 1$. Find $g(f(-3))$ and $f(g(4))$. Be sure to **show all work** to receive credit.

$g(f(-3)) = \boxed{}$

$f(g(4)) = \boxed{}$