

By signing below, you attest that you have neither given nor received help of any kind on this exam.

Signature: _____ Printed Name: _____

Instructions: Show work to get full credit (the correct answer may NOT be enough). Do all your work on the paper provided. Write clearly! Double check your answers!

You will **not** receive full credit for using methods other than those discussed in class.

Calculators are not permitted.

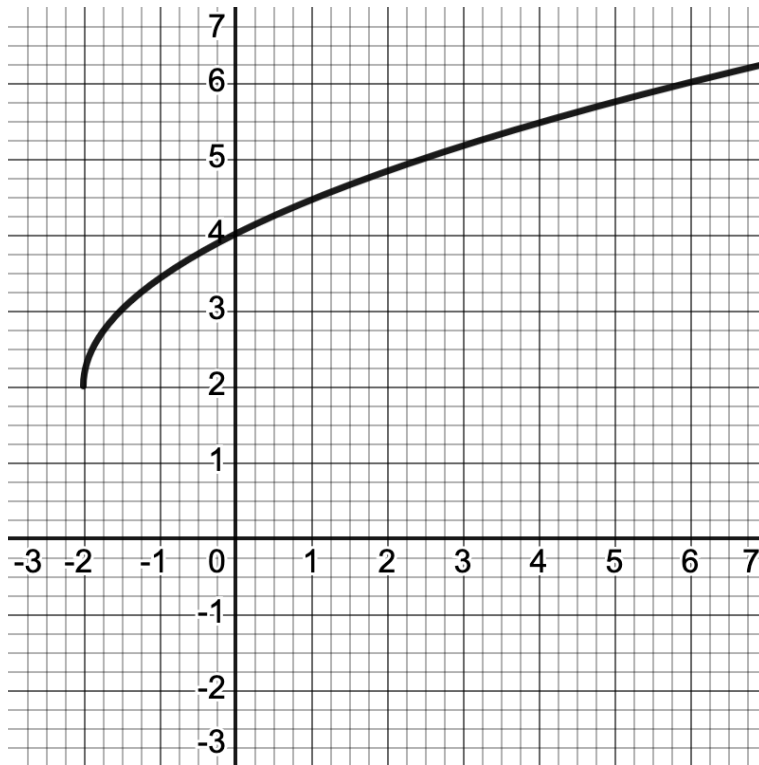
EXAM I

MAT 181-050 – CALCULUS I

Problem Number	Available Points	Your Points
1	8	
2	8	
3	10	
4	10	
5	4	
Total	40	

1. Consider the graph of $f(x) = 2 + \sqrt{2x + 4}$ below.

[(8)]



(a) Is $f(x)$ a polynomial, a rational, an algebraic, or a transcendental function?

[1]

(b) Compute and simplify the expression $f(\frac{1}{2}x^2)$.

[1]

(c) What is the domain and range of this function? Use interval notation.

[2]

(d) Find a formula for the inverse function $f^{-1}(x)$ and sketch it on the graph above, labeling **at least two points** on the graph of $y = f^{-1}(x)$.

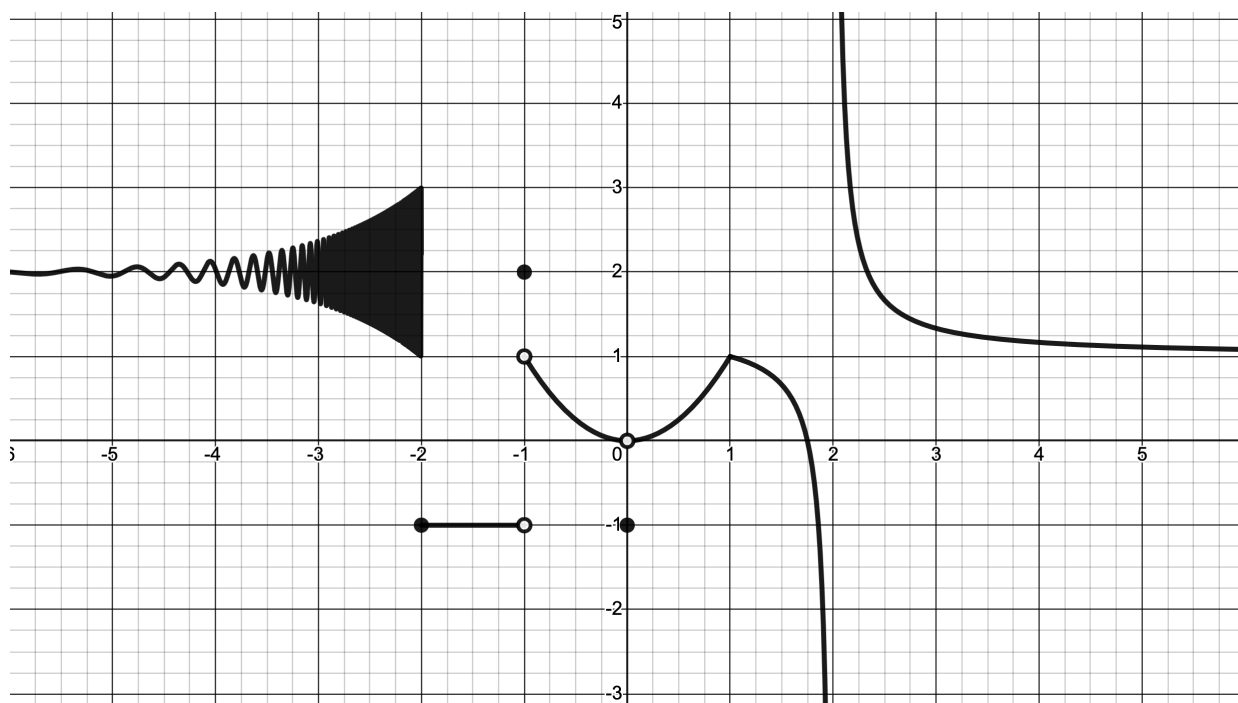
[3]

(e) Compute $f^{-1}(4)$.

[1]

2. Consider the graph of the function $f(x)$ below:

[(8)]



- (a) Use the graph to fill in the entries of the table below. If the limit exists, write the value of the limit. If the limit is infinite, write ∞ or $-\infty$. If the limit does not exist, write DNE. For the last row, write “Yes” or “No.”

[5]

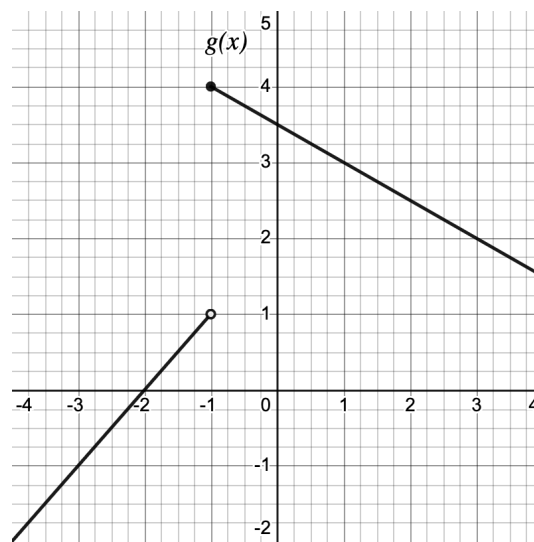
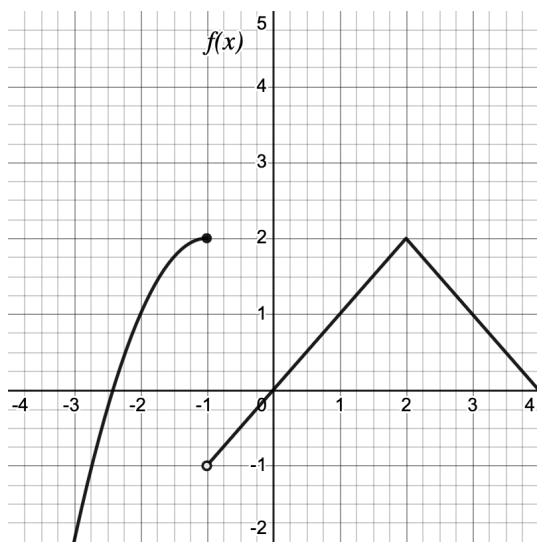
	$c = -2$	$c = -1$	$c = 0$	$c = 1$	$c = 2$
$\lim_{x \rightarrow c^-} f(x)$					
$\lim_{x \rightarrow c^+} f(x)$					
$\lim_{x \rightarrow c} f(x)$					
$f(c)$					
Is f continuous at c ?					

- (b) Does this function have any **HORIZONTAL** and/or **VERTICAL** asymptotes? If so, **write the appropriate limit(s)** to justify your answer.

[3]

3. Consider the two functions $f(x)$ and $g(x)$ whose graphs are given below:

[(10)]



(a) Compute $(g - f)(2)$.

[1]

(b) Compute $(g \circ f)(-2)$, if possible.

[2]

(c) Compute $\lim_{x \rightarrow 1} [(g/f)(x) + 3]$.

[2]

(d) Compute $\lim_{x \rightarrow -1} [f(x) + g(x)]$ by explicitly computing the one-sided limits.

[3]

(e) Is the function $(f + g)(x)$ continuous at $x = -1$? Justify your answer by referencing the continuity checklist.

[2]

4. Evaluate the following limits. If the limit is infinite, write ∞ or $-\infty$. If the limit does not exist, write DNE. You must show *at least* one intermediate step to receive full credit. [(10)]

(a) $\lim_{x \rightarrow 3} \frac{2x^2 - 18}{x^2 + 2x - 15}$ [2]

(b) $\lim_{x \rightarrow \infty} -3x^2 + 3x - 6$ [2]

(c) $\lim_{x \rightarrow -1} \frac{4x^2 - 4}{x^2 - x - 1}$ [2]

(d) $\lim_{x \rightarrow 7} \frac{x - 7}{\sqrt{x} - \sqrt{7}}$ [2]

(e) $\lim_{x \rightarrow 7^+} \frac{60}{7 - x}$ [2]

5. Consider the following piecewise function:

[(4)]

$$f(x) = \begin{cases} \frac{x^2 + x - 2}{x + 2} & \text{if } x < -2 \\ -3 & \text{if } x = -2 \\ 3x^2 + 6x - 2 & \text{if } x > -2 \end{cases}$$

You must completely justify your answers to the following questions by explicitly evaluating appropriate limits. Is this function continuous at $x = -2$? At $x = -2$, is the function left-continuous, right-continuous, or neither?