

Assigned date: 08/30/2021 9am
Due date: 09/06/2021 11:59am

Last name: _____
First name: _____
Section: _____

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|-----------|----|----|----|----|----|----|----|----|-------|
| Question: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
| Points: | 15 | 15 | 15 | 15 | 10 | 10 | 10 | 10 | 100 |
| Score: | | | | | | | | | |

Instructions: You must answer all the questions below and upload your solutions (in a PDF format) to Gradescope (go to www.gradescope.com with the Entry code GEK6Y4). Be sure that after you scan your copy, it is clear and readable. You must name your file like this: LASTNAME_FIRSTNAME.pdf. A homework may not be corrected if it's not readable and if it's not given the good name. No other type of files will be accepted (no PNG, no JPG, only PDF) and no late homework will be accepted. Good luck!

QUESTION 1 (15 points)

Find the domain of the following functions.

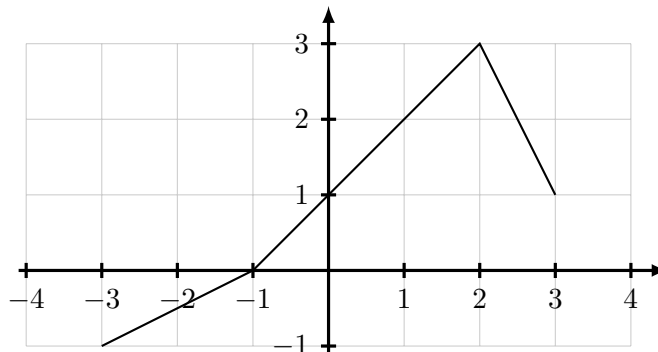
(a) (5 points) $f(x) = x^2 + 1$.

(c) (5 points) $f(x) = \frac{1}{x^2 - 1}$.

(b) (5 points) $f(x) = \sqrt[4]{x - 2}$.

QUESTION 2 (15 points)

The function $f(x)$ is defined by the following graph:



- (a) (3 points) What is $f(-3)$, $f(-1)$ and $f(2)$.
- (b) (2 points) Is $f(4)$ and $f(-4)$ defined?
- (c) (2 points) Find the value(s) of x for which $f(x) = 1$.
- (d) (2 points) Find the domain of the function.
- (e) (2 points) Find the range of the function.
- (f) (2 points) On what interval is f increasing.
- (g) (2 points) Estimate the value of $f(-2)$.

QUESTION 3

(15 points)

Sketch the graph of the following functions from $x = -3$ to $x = 3$.

- (a) (5 points) $f(x) = x + |2x|$.
- (c) (5 points) $f(x) = |x| + |x + 1|$
- (b) (5 points) $f(x) = 2x + x^2$.

QUESTION 4

(15 points)

For each of the following function, simplify the difference quotient.

- (a) (5 points) The function $f(x) = 4 + 3x - x^2$ and the difference quotient $\frac{f(3+h)-f(3)}{h}$.
- (b) (5 points) The function $f(x) = \frac{x+5}{x}$ and the difference quotient $\frac{f(x)-f(1)}{x-1}$.
- (c) (5 points) The function $f(x) = \frac{x^2-x}{x-1}$ and the difference quotient $\frac{f(w)-f(0)}{w}$.

QUESTION 5

(10 points)

A Basketball with radius r has a volume of $V(r) = \frac{4}{3}\pi r^3$. Find a function that represents the amount of air required to inflate the ball from a radius of r inches to a radius of $r + 1$ inches.

QUESTION 6

(10 points)

Express the following functions in the form $f \circ g$. For b), give the domain of the function G .

- (a) (5 points) $u(t) = \frac{\tan t}{1+\tan t}$.
- (b) (5 points) $G(v) = \sqrt[5]{\frac{x+1}{x}}$.

QUESTION 7

(10 points)

Use the graph of the function $f(x)$ illustrated in Figure 1 to evaluate the limits.

- (a) (2 points) $\lim_{x \rightarrow -3} f(x)$.
- (d) (2 points) $\lim_{x \rightarrow 3^-} f(x)$.
- (b) (2 points) $\lim_{x \rightarrow -2} f(x)$.
- (c) (2 points) $\lim_{x \rightarrow 0} f(x)$.
- (e) (2 points) $\lim_{x \rightarrow 3^+} f(x)$.

QUESTION 8

(10 points)

Evaluate the following limits using the Limit Laws.

- (a) (5 points) $\lim_{x \rightarrow 1} \left[\sqrt[3]{\frac{(2x-11)^2}{3}} + x^2 \right]$.
- (b) (5 points) $\lim_{y \rightarrow -1} \frac{y^2+2y+1}{y+1}$.

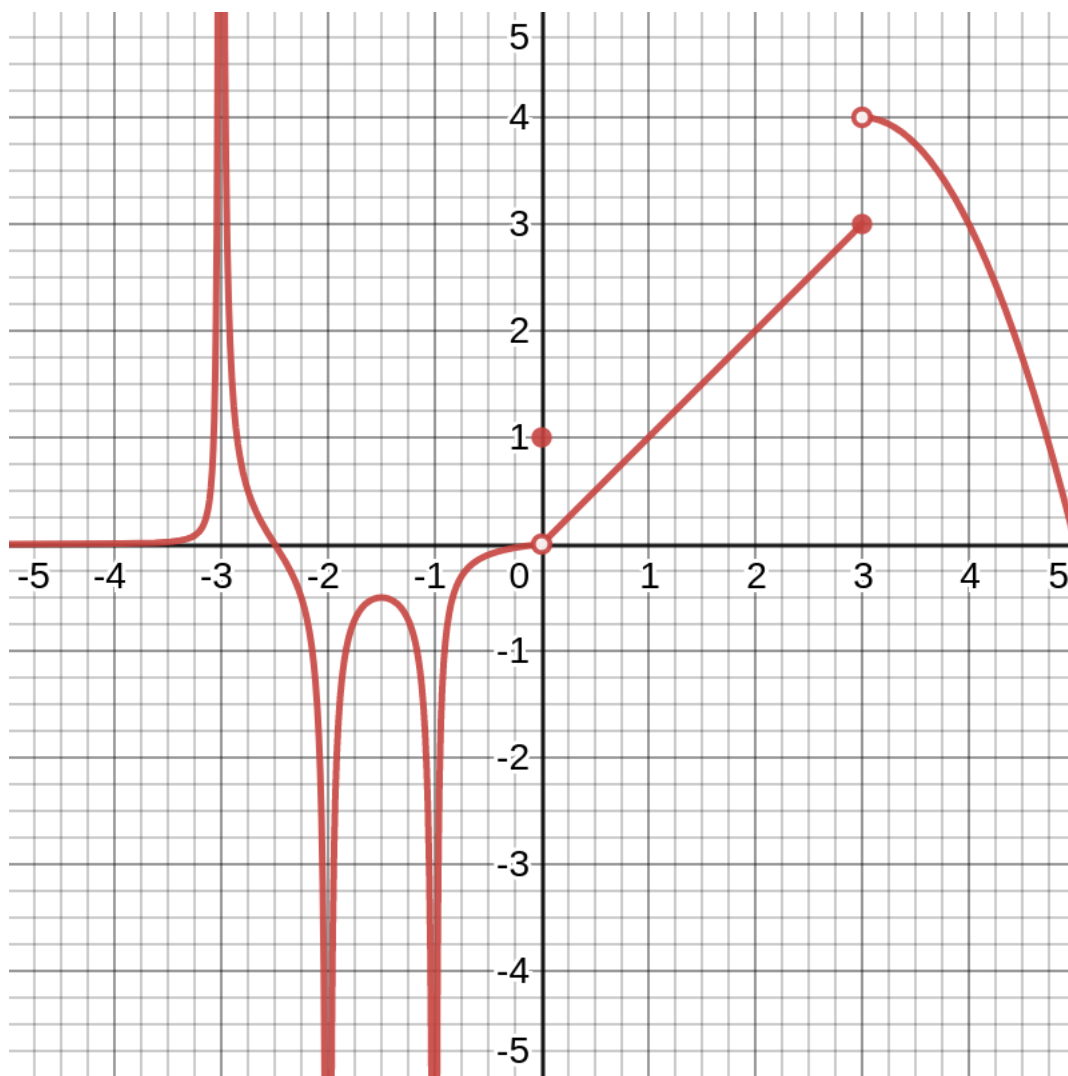


Figure 1: Graph of the function in question 7