

Name: Solutions

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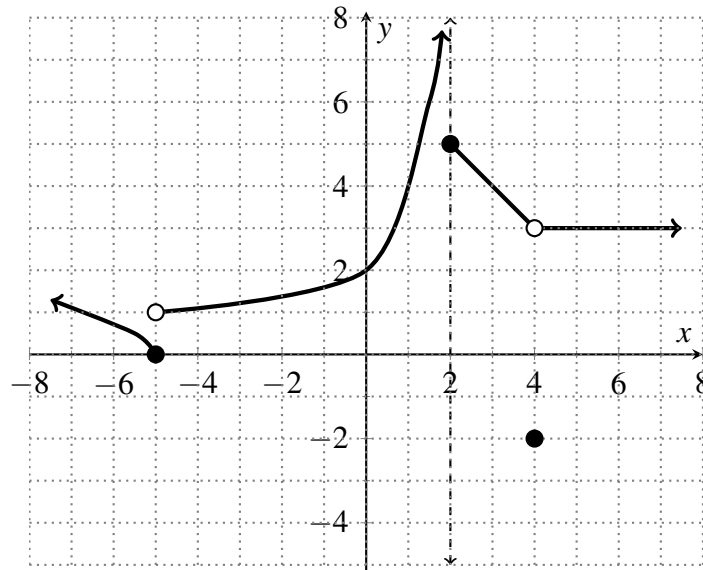
Please circle your instructor's name:

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There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. [9 points] Use the graph of the function of $f(x)$ to answer the following questions.



- a. $\lim_{x \rightarrow -5^-} f(x) = 0$
- b. $\lim_{x \rightarrow -5^+} f(x) = 1$
- c. $\lim_{x \rightarrow -5} f(x) = DNE$
- d. $f(-5) = 0$
- e. $f(2) = 5$
- f. $f(4) = -2$
- g. $\lim_{x \rightarrow 0} f(x) = 2$
- h. $\lim_{x \rightarrow 2^-} f(x) = \infty$
- i. $\lim_{x \rightarrow 4} f(x) = 3$

2. [4 points] An empty tank can hold 2000 gallons of water and is filled in one hour. The values in the table show the volume V of water in the tank (in gallons) after t minutes.

t (minutes)	0	10	20	30	40	50	60
V (gallons)	0	200	500	1100	1500	1800	2000

Check change \rightarrow 200 300 600 400 300 200

a. Find the average rate of change of the water in the tank in the first half of an hour. Include units in your answer.

$$\frac{1100 - 0}{30 - 0} = \frac{110}{3} \text{ gal per minute OR } 220 \text{ gal per hour}$$

b. During what 10 minute interval was the average rate of change of the water the greatest (in magnitude)?

$$[20, 30] \text{ where avg. rate of change is } \frac{600}{10} = 60 \text{ gal/min}$$

3. [6 points] Compute the following infinite limits. For each limit, justify your answer with a sentence or two.

a. $\lim_{x \rightarrow 8^+} -2\ln(x-8) = \infty$

The graph is $y = \ln x$ shifted 8 units right and reflected about x :

b. $\lim_{x \rightarrow \pi^+} \frac{x+1}{\pi-x} = -\infty$

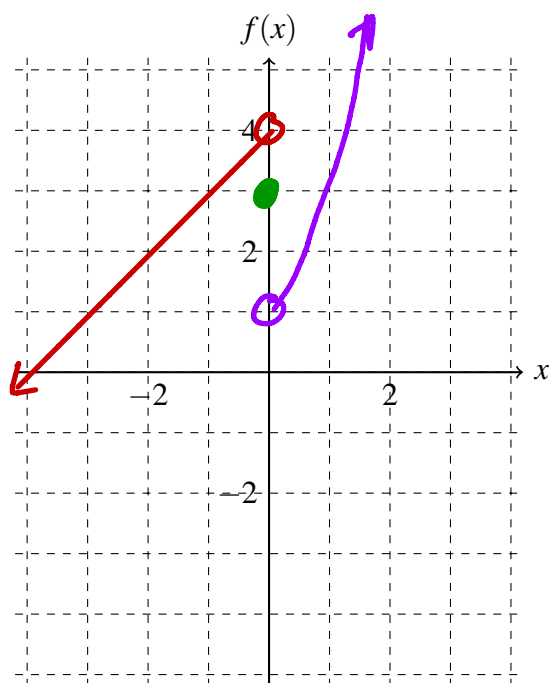
$x+1$ is positive for x near π .

$\pi-x$ is negative for x larger than π .

4. [6 points] On the axes below, sketch the graph of the function

$$f(x) = \begin{cases} 4+x & x < 0 \\ 3 & x = 0 \\ e^x & x > 0 \end{cases}$$

Then compute, with brief justification, the requested values in the table.



Value	Justification
$f(0) =$	3, by definition
$\lim_{x \rightarrow 0^-} f(x) =$	4, we're using the formula $4+x$
$\lim_{x \rightarrow 0^+} f(x) =$	DNE. There is a jump in the graph at $x=0$. OR On the left $f \rightarrow 4$ and on the right $f \rightarrow 1$.