MAT #251 QUIZ #2

Name: SOLUTIONS _____ / 25

Circle one: **Rhodes (F01)** | **Bueler (F02)** | **Jurkowski (F03)**

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

1. [4 points] In successive weeks, the amount of heating oil in a tank is recorded, as shown in the table.

t (weeks)	1	2	3	4	5	6
A (gallons)	321	284	258	197	154	87

a. Find the average rate at which the amount changed over the entire period. Specify units.

$$m_{av} = \frac{87-321}{6-1} = \frac{-234}{5} \quad \frac{\text{gal}}{\text{week}}$$

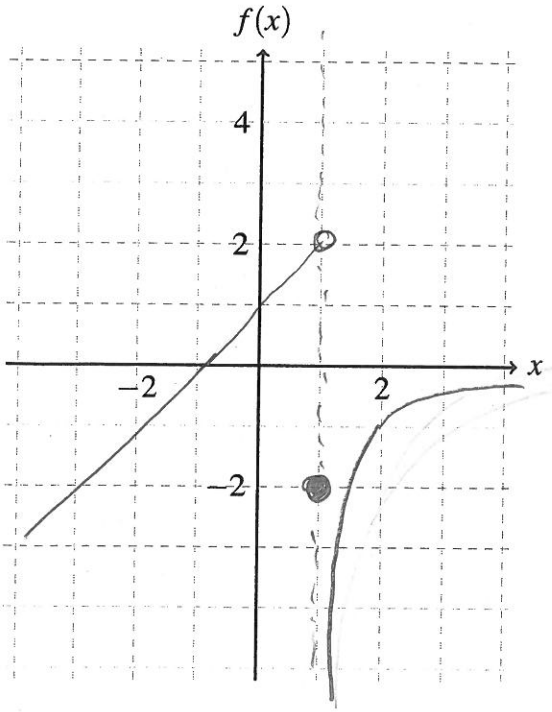
b. Find the average rate of change from week 2 to week 4.

$$m_{av} = \frac{197-284}{4-2} = \frac{-87}{2} \quad \frac{\text{gal}}{\text{week}}$$

2. [6 points] On the axes below, sketch the graph of the function

$$f(x) = \begin{cases} 1+x & x<1 \\ -2 & x=1 \\ \frac{1}{1-x} & x>1. \end{cases}$$

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



Value	Justification
$f(1) =$ -2	-2 given
$\lim_{x\to 1^-} f(x) =$ 2	$\lim_{x\to 1^-} f(x) = \lim_{x\to 1^-} 1+x = 2$
$\lim_{x\to 1} f(x) =$ d.n.e.	one-sided limits are not equal

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

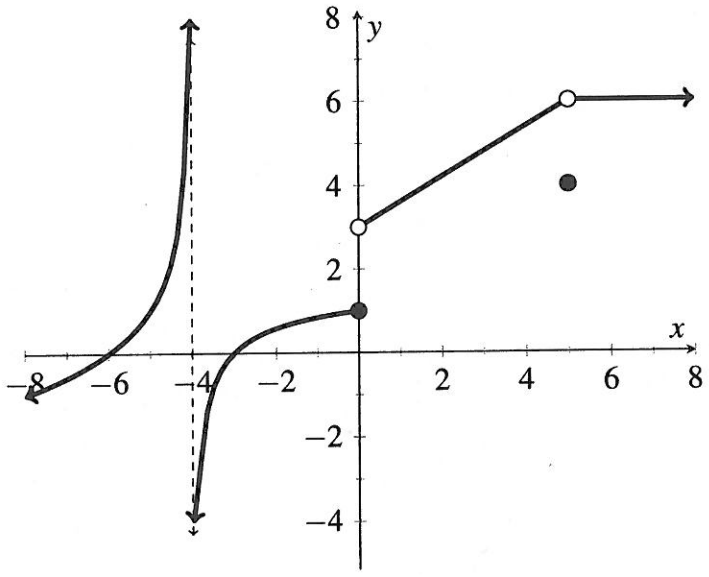
a. $\lim_{x\to\pi^+} \dfrac{\sqrt{7}}{\sin(x)} =$ $\boxed{-\infty}$

As $x \to \pi$ from the right, $\sin(x) \to 0$ but is negative. $\sqrt{7}$ divided by negative number approaching 0 gives negative numbers of increasing magnitude.

b. $\lim_{x\to 3^+} \dfrac{x+2}{(x-3)^3} =$ $\boxed{\infty}$

As $x \to 3$ from the right, $x+2 \to 5$ and $(x-3)^3 \to 0$ but is positive. A number near 5 divided by smaller and smaller positive numbers gives larger and larger ones.

4. [9 points] Use the graph of the function of $f(x)$ to answer the following questions.



a. $f(-6) =$ 0 **b.** $f(0) =$ 1 **c.** $f(5) =$ 4

d. $\lim_{x\to 0^+} f(x) =$ 3 **e.** $\lim_{x\to 0^-} f(x) =$ 1 **f.** $\lim_{x\to 0} f(x) =$ DNE

g. $\lim_{x\to -4^+} f(x) =$ $-\infty$ **h.** $\lim_{x\to 5} f(x) =$ 6 **i.** $\lim_{x\to -6} f(x) =$ 0