Name: ____________________ ________ / 25

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

1. [4 points] A population of voles is taking over a garden. The table below indicates the size of the population measured at the middle of each week during a summer.

t (weeks)	1	2	3	4	5	6
n (voles)	7	15	31	63	73	82

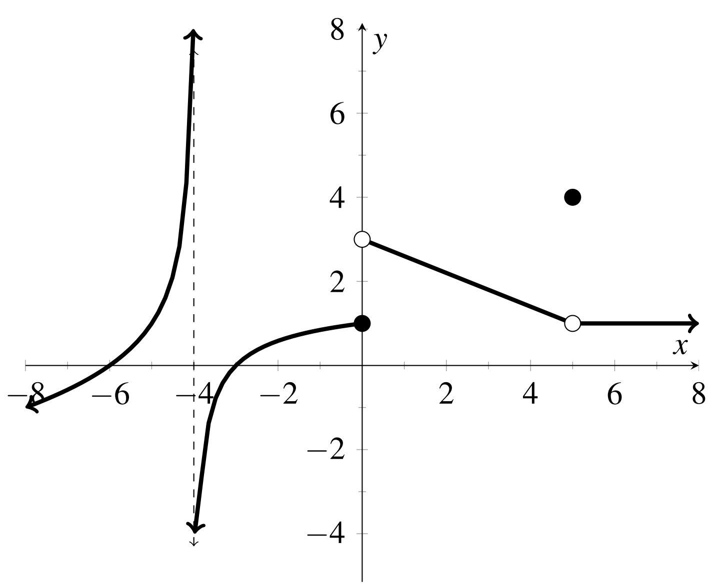
a. Find the average rate of change of the population over the entire measurement period.

$$\frac{82-7}{6-1} = \frac{75}{5} = 15 \text{ voles/week}$$

b. Find the average rate of change of the population from week 3 to week 5.

$$\frac{73-31}{5-3} = \frac{42}{2} = 21 \text{ voles/week}$$

2. [9 points] Use the graph of the function of $f(x)$ to answer the following questions.



a. $\lim_{x\to 0^+} f(x) =$ 3

b. $\lim_{x\to 0^-} f(x) =$ 1

c. $\lim_{x\to 0} f(x) =$ DNE

d. $f(0) =$ 1

e. $f(5) =$ 4

f. $f(-6) =$ 0

g. $\lim_{x\to -4^+} f(x) =$ $-\infty$

h. $\lim_{x\to 5} f(x) =$ 1

i. $\lim_{x\to -6} f(x) =$ 0

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

a. $\lim_{x\to 8^+} \frac{2+x}{(x-8)^2} = \boxed{\infty}$

$\lim_{x\to 8^+} 2+x = 10 > 0$

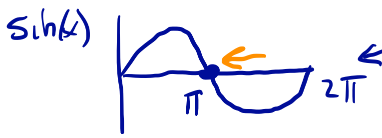
$\lim_{x\to 8^+} (x-8)^2 = 0$

$(x-8)^2 > 0$ for x near 8, $x \neq 8$

$\frac{10}{0^+} \Rightarrow +\infty$

b. $\lim_{x\to \pi^+} \frac{\sqrt{2}}{\sin(x)} = \boxed{-\infty}$

As $x \to \pi^+$, $\sin(x) \to 0^-$.

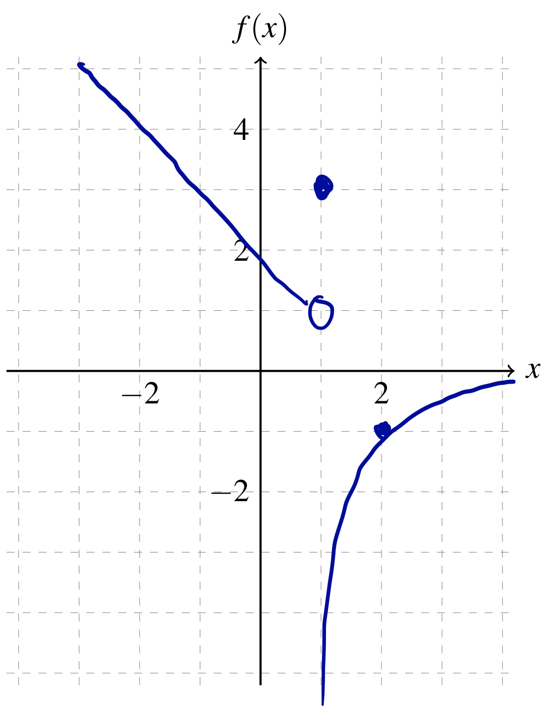


$\frac{\sqrt{2}}{0^-} \Rightarrow -\infty$

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

$$f(x) = \begin{cases} 2-x & x<1 \\ 3 & x=1 \\ \frac{1}{1-x} & x>1. \end{cases}$$

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



Value	Justification
$f(1) =$ 3	The function definition
$\lim_{x\to 1^-} f(x) =$ 1	$\lim_{x\to 1^-} 2-x = 2-1 = 1$
$\lim_{x\to 1} f(x) =$ DNE	$\lim_{x\to 1^-} f(x) = 1$; $\lim_{x\to 1^+} f(x) = -\infty$; $1 \neq -\infty$