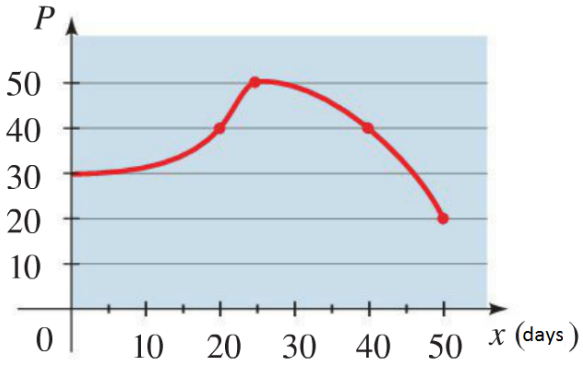
Name: Solutions _____ / 25

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

1. [5 points] The graph below shows the population P of mice in a particular garden over the course of 50 days. Give answers to the following in correct units.



a. Find the number of mice on days 25 and 40.

$P(25) = 50$ mice $\quad P(40) = 40$ mice

b. Find the average rate of change of the population from $x = 25$ to $x = 40$.

$$\frac{P(40)-P(25)}{40-25} = \frac{40-50}{40-25} = \frac{-10}{15} = -\frac{2}{3} \text{ mice/day}$$

c. Find the average rate of change of the population during the entire period.

$$\frac{P(50)-P(0)}{50-0} = \frac{20-30}{50} = \frac{-10}{50} = -\frac{1}{5} \text{ mice/day}$$

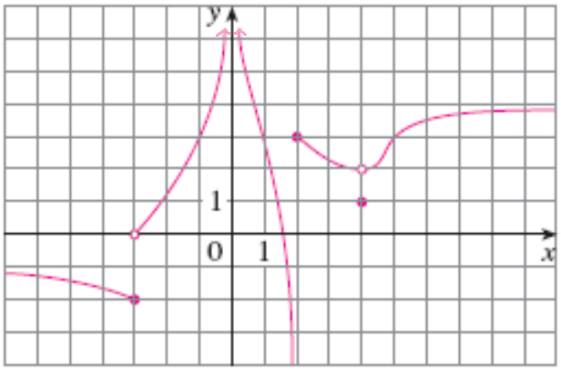
2. [6 points] Compute the following limit. Justify your answer with a sentence or two.

$$\lim_{x\to 1^+} \frac{(x-3)^2}{1-x} = \boxed{-\infty}$$

As $x \to 1^+$, $1-x \to 0^-$, and $(x-3) \to 4$.

$$\frac{4}{0^-} = -\infty.$$

3. [9 points] Use the graph of the function of $f(x)$ to answer the following questions.



a. $\lim_{x\to 4} f(x) =$ 2 **b.** $\lim_{x\to 2^-} f(x) =$ ∞ **c.** $\lim_{x\to -1} f(x) =$ 3

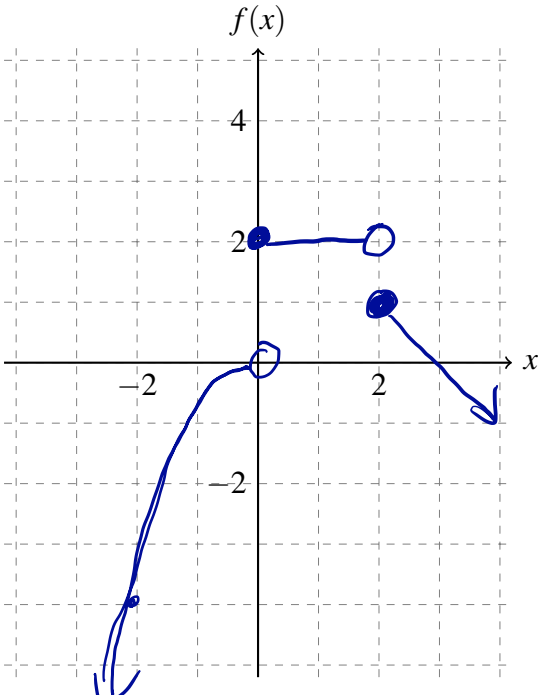
d. $f(-1) =$ 3 **e.** $f(4) =$ 1 **f.** $f(-3) =$ -2

g. $\lim_{x\to -3^-} f(x) =$ -2 **h.** $\lim_{x\to -3^+} f(x) =$ 0 **i.** $\lim_{x\to -3} f(x) =$ DNE

4. [5 points] On the axes below, sketch the graph of the function

$$f(x) = \begin{cases} -x^2 & x < 0 \\ 2 & 0 \le x < 2 \\ 3 - x & x \ge 2. \end{cases}$$

Then compute the requested values in the table if they exist.



	State the value if it exists. If it does not exist state why.
$f(2) =$	1
$\lim_{x\to 2^-} f(x) =$	2
$\lim_{x\to 2} f(x) =$	DNE $\lim_{x\to 2^-} f(x) = 2$ but $\lim_{x\to 2^+} f(x) = 1$