MA125 Quiz 3

Name: KEY

1) (8 pts) Suppose a function is defined by

$$f(x) = 2^{(x+3)} + 2$$

Find the slope of the secant line joining the points

$$(2, f(2)) \quad \text{and} \quad (4, f(4))$$

Slope of secant: $\frac{f(4)-f(2)}{4-2}$ $\quad f(2) = 2^{(2+3)} + 2 = 34$ $\quad f(4) = 2^{(4+3)} + 2 = 130$

$= \frac{130-34}{2} = \frac{96}{2} = 48$

2) (8 pts) If an arrow is shot upward on the moon with a velocity of $58m/s$, its height in meters t seconds later is given by

$$h(t) = 58t - 0.83t^2$$

Find the average velocity of the arrow over the time interval $[1, 2]$.

$V_{avg} = \frac{h(2)-h(1)}{2-1}$

(OVER) $\quad h(2) = 58 \cdot 2 - (.83) \cdot 2^2$

$= 58 \cdot 2 - (.83) \cdot 4 = 116 - 3.32$

$= 112.68$

$h(1) = 58 \cdot 1 - (.83) 1^2 = 58 - .83$

$= 57.17$

$V_{avg} = \frac{112.68 - 57.17}{2-1} = \frac{55.51}{1} = 55.51 \text{ m/s}$

3) (9 pts) A function is defined piecewise by the formula:

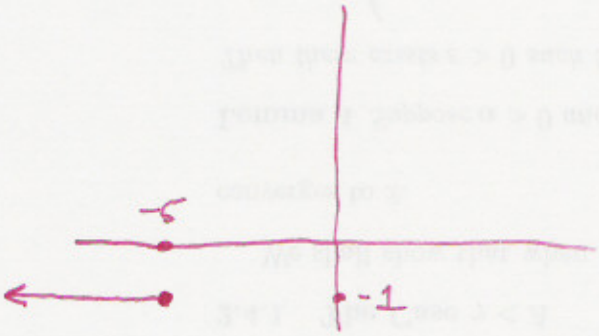
$$f(x) = \begin{cases} -1 & x \leq -5 \\ 24 - x^2 & -5 < x < 0 \\ 0 & x = 0 \\ 24 - x & x > 0 \end{cases}$$

Find the following limits if they exist. If they do not exist, explain why.

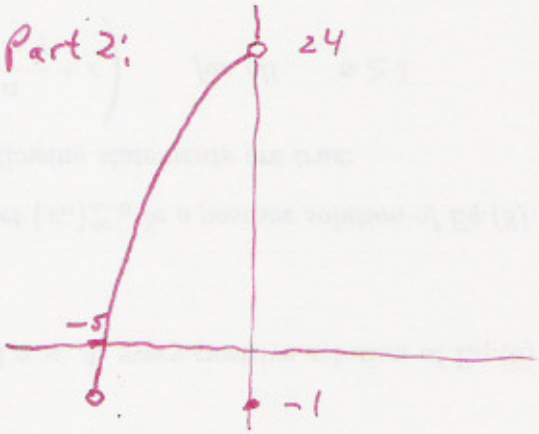
a) $\lim_{x \to -5^-} f(x)$
b) $\lim_{x \to -5^+} f(x)$
c) $\lim_{x \to -5} f(x)$
d) $\lim_{x \to 0^-} f(x)$
e) $\lim_{x \to 0^+} f(x)$
f) $\lim_{x \to 0} f(x)$

Piecewise Function:

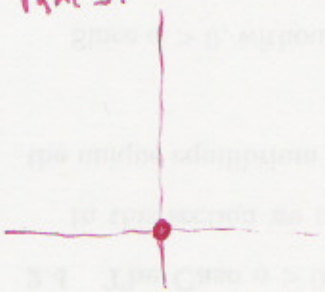
Part 1:



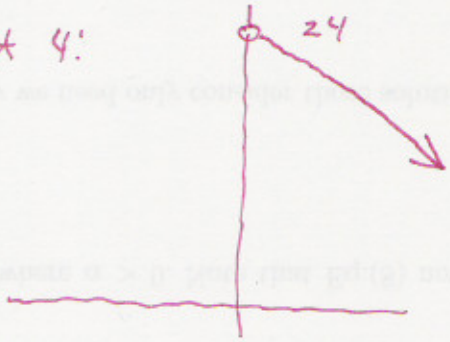
Part 2:



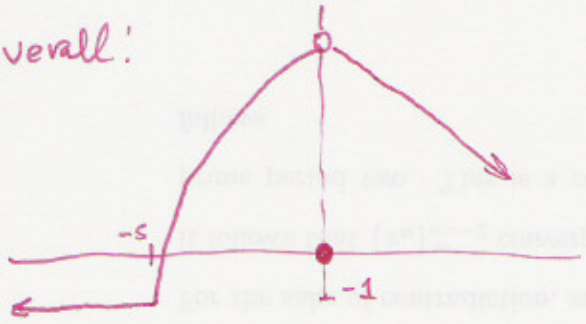
Part 3:



Part 4:



Overall:



a) -1 b) -1 c) -1

d) 24 e) 24 f) 24

$\lim_{x \to 0} f(x) = 24$ because the left and right hand limits are both 24. $f(0) = 0$ is not relevant; $f(0)$ doesn't play any role in the limit as $x \to 0$ of f.