Pledge:

1/25/2006
Dr. Lunsford

MATH261 Calculus I
Quiz 2

Name: Solution
(20 Points Total)

I. Use the graph of the function f below to find the indicated function values and limits. (1 point each, 10 points total)

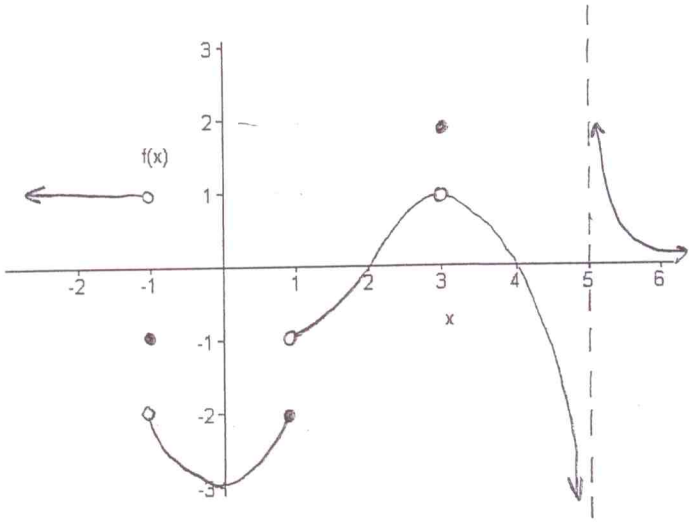
$f(0) = -3$ $\quad f(3) = 2$

$f(-1) = -1$ $\quad \lim_{x\to -1^-} f(x) = 1$

$\lim_{x\to -1^+} f(x) = -2$ $\quad \lim_{x\to 3} f(x) = 1$

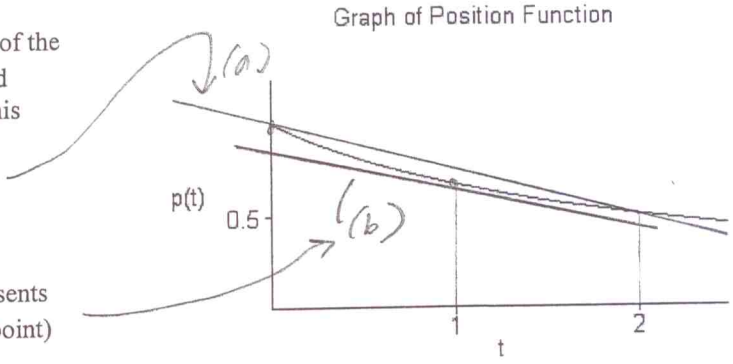
$\lim_{x\to 2} f(x) = 0$ $\quad \lim_{x\to 5^-} f(x) = -\infty$

$\lim_{x\to 1} f(x) = DNE$ $\quad \lim_{x\to 1^+} f(x) = -1$



II. A particle moves along a straight path. Its position function is given by the function $p(t) = \dfrac{2}{2+t}$ where $p(t)$ is in inches and t is in seconds. A graph of this function is given below. Please answer the following questions being sure to neatly show all of your work. (10 points total)

Graph of Position Function



(a) Find the average velocity (i.e. rate of change) of the particle from $t = 0$ to $t = 2$ seconds. Draw (and clearly indicate) the line whose slope represents this velocity on the graph. (3 points)

$\dfrac{p(2)-p(0)}{2-0} = \dfrac{\frac{1}{2}-1}{2} = -\frac{1}{4}$ in/s

(b) Draw the line on the graph whose slope represents that velocity of the particle at $t = 1$ seconds. (1 point)

(c) Find an expression that gives the average velocity (i.e. rate of change) of the particle from $t = 1$ to $t = \hat{t}$ seconds. (4 points)

$\dfrac{p(\hat{t})-p(1)}{\hat{t}-1} = \dfrac{\frac{2}{2+\hat{t}} - \frac{2}{3}}{\hat{t}-1} = \dfrac{-2}{3(2+\hat{t})}, \hat{t} \neq 1$

Sorry if you can't do the algebra to get to here...

↖ Answer correct at this point

(d) Complete the chart below and use it to estimate the velocity of the particle at $t = 1$ seconds. Please round all answers to six decimal places. (2 points)

$\hat{t}$	0.99	0.999	1.001	1.01
Average Velocity from $t = 1$ to $t = \hat{t}$ seconds	-.222965	-.222296	-.222148	-.221484

Velocity at $t = 1$ seconds $\approx -.\overline{2}$

$\rightarrow = \lim_{\hat{t}\to 1} \dfrac{p(\hat{t})-p(1)}{\hat{t}-1} = \lim_{\hat{t}\to 1} \dfrac{-2}{3(2+\hat{t})} = -\frac{2}{9} = -.\overline{22}$