Calculus AB 1.4, 1.5, 3.5 Quiz Review Session

1. $g(x) = \begin{cases} \frac{9-x^2}{x^2-16}, & x < -4 \\ 2 - x, & x = -4 \\ \frac{-x^2}{x+2}, & x > -4 \end{cases}$ Given the piecewise function, find the following:

a. $\lim\limits_{x \to -4^-} g(x) =$

b. $\lim\limits_{x \to -\infty} g(x) =$

c. $\lim\limits_{x \to -4^+} g(x) =$

d. $\lim\limits_{x \to -4} g(x) =$

e. $\lim\limits_{x \to \infty} g(x) =$

1b) Step through continuity conditions for #1 .Then state reason for discontinuity and identify the type of discontinuity. (at $x = -4$)

2. Find the horizontal asymptote(s) of $f(x) = \frac{-x-5}{\sqrt{4x^2+12x-30}}$

3. Show whether Intermediate Value Theorem applies. Then find c. (Go through conditions!).
$f(x) = \frac{x}{x-3}$; [4, 8] $f(c) = 2$ c = ____________

4. Find values for below:

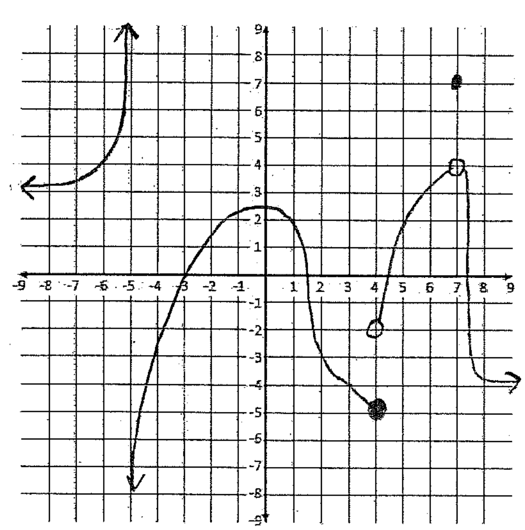
a. $\lim\limits_{x \to -5^-} g(x) =$

b. $\lim\limits_{x \to -\infty} g(x) =$

c. $\lim\limits_{x \to 4^+} g(x) =$

d. $\lim\limits_{x \to 7} g(x) =$

e. $\lim\limits_{x \to \infty} g(x) =$



Calculus AB 1.4, 1.5, 3.5 Quiz Review Session *Solution Key*

1. $g(x) = \begin{cases} \frac{9-x^2}{x^2-16}, & x < -4 \\ 2-x, & x = -4 \\ \frac{-x^2}{x+2}, & x > -4 \end{cases}$ Given the piecewise function, find the following:

a. $\lim_{x\to -4^-} g(x) =$

$\lim_{x\to -4^-} \frac{9-x^2}{x^2-16}$

$\lim_{x\to -4^-} \frac{9-x^2}{(x-4)(x+4)} = \frac{9-(-4.1)^2}{(\;)(\;)} = \frac{-}{(-)(-)}$

$= \boxed{-\infty}$

b. $\lim_{x\to -\infty} g(x) =$

$\lim_{x\to -\infty} \frac{9-x^2}{x^2-16} = \boxed{-1}$

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

$\lim_{x\to -4^+} \frac{-x^2}{x+2} = \frac{-16}{-2} = \boxed{8}$

d. $\lim_{x\to -4} g(x) =$

$\lim_{x\to -4^-} f(x) \neq \lim_{x\to -4^+} f(x)$

$\boxed{DNE}$

e. $\lim_{x\to \infty} g(x) =$

$\lim_{x\to \infty} \frac{-x^2}{x+2} = \frac{-}{+} = \boxed{-\infty}$

1b) Step through continuity conditions for #1 .Then state reason for discontinuity and identify the type of discontinuity.

i) $f(-4) = 6$

ii) $\lim_{x\to -4^-} f(x) \neq \lim_{x\to -4^+} f(x)$

Nonremovable discontinuity since $\lim_{x\to -4} f(x) = DNE$

2. Find the horizontal asymptote(s) of $f(x) = \frac{-x-5}{\sqrt{4x^2+12x-30}}$

$\boxed{\text{H.A. at } y = -1/2 \text{ and } y = 1/2}$

$\lim_{x\to +\infty} \frac{-x-5}{\sqrt{4x^2+12x-30}} = \frac{-1}{\sqrt{4}} = \frac{-1}{2}$

$\lim_{x\to -\infty} \frac{-x-5}{\sqrt{4x^2+12x-30}} = \lim_{x\to -\infty} \frac{-x-5}{-\sqrt{4x^2+12x-30}} = \frac{-1}{-\sqrt{4}} = \frac{1}{2}$

3. Show whether Intermediate Value Theorem applies. Then find c. (Go through conditions!).

$f(x) = \frac{x}{x-3}$; $[4, 8]$, $k = 2$ $c =$ 6

i) $f(x)$ continuous on interval $[4, 8]$

ii) $f(4) = 4$

$f(8) = \frac{8}{8-3} = \frac{8}{5} \approx 1.6$

$\frac{x}{x-3} = \frac{2}{1}$

$2(x-3) = x$

$2x - 6 = x$

$x = 6$ so $\boxed{c = 6}$

Since $f(8) < f(c) < f(4)$ IVT applies and c exists in interval.

4. Find values for below:

a. $\lim_{x\to -5^-} g(x) = +\infty$

b. $\lim_{x\to -\infty} g(x) = 3$

c. $\lim_{x\to 4^+} g(x) = -2$

d. $\lim_{x\to 7} g(x) = 4$

e. $\lim_{x\to \infty} g(x) = -4$