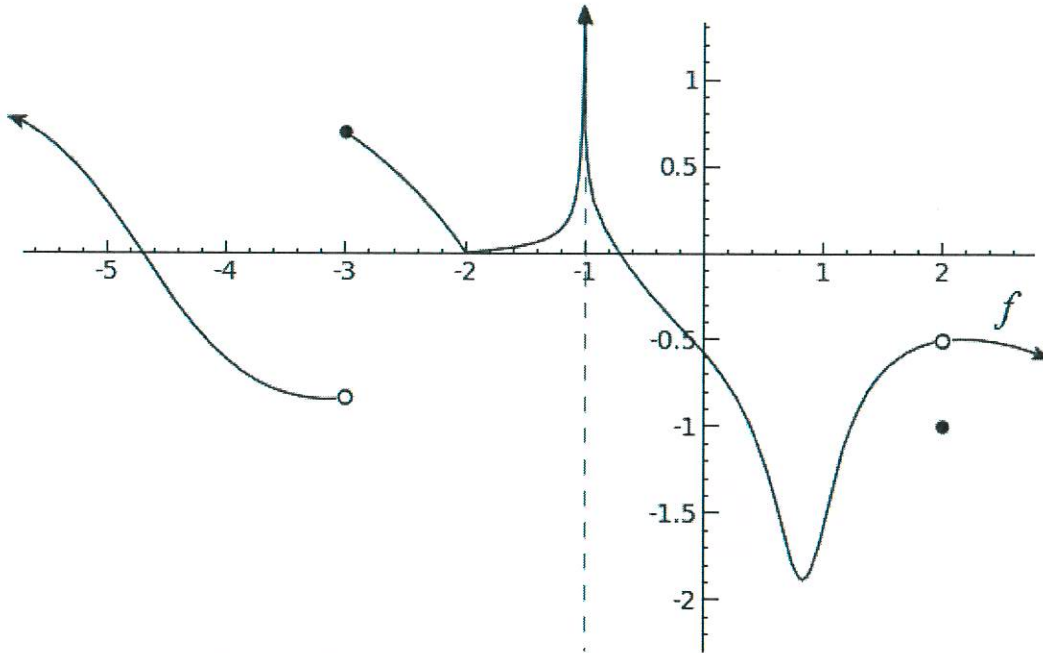


Calculus 30
Chapter 3 – Limits and Continuity Practice Assessment

Name: Answer Key

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1. Use this graph to answer the following questions:



a) $\lim_{x \rightarrow -3^-} f(x)$
 -0.75

b) $\lim_{x \rightarrow -3^+} f(x)$
 0.75

c) $\lim_{x \rightarrow 2} f(x)$
 -0.5

d) $\lim_{x \rightarrow -2} f(x)$
 does not exist

e) $\lim_{x \rightarrow -\infty} f(x)$
 ∞

f) $\lim_{x \rightarrow -1^+} f(x)$
 ∞

g) List all point where f(x) is not continuous.

-3, -1, 2

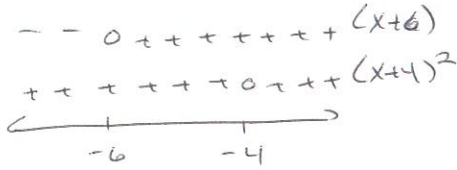
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2. Find the following Limits. All 9 types are given here, but you may use any of the nine systems of finding limits that you wish for each question.

a) $\lim_{x \rightarrow 2} x + 3$

$2 + 3$
 $\textcircled{5}$

b) $\lim_{x \rightarrow -4} \frac{x + 6}{(x + 4)^2}$ → Critical @ $x = -6$
→ $x = -4$



$\textcircled{\infty}$

c) $\lim_{x \rightarrow 6} \frac{\sqrt{3+x}-3}{x-6} \left(\frac{\sqrt{3+x}+3}{\sqrt{3+x}+3} \right)$

$\frac{3+x-9}{(x-6)(\sqrt{3+x}+3)}$

$\frac{x-6}{(x-6)(\sqrt{3+x}+3)}$

$\frac{1}{\sqrt{3+6}+3}$

$\frac{1}{3+3}$

$\textcircled{\frac{1}{6}}$

d) $\lim_{x \rightarrow \infty} \frac{\sqrt{4x^2 - x - 8}}{x^2 + 9}$

$\frac{x^4 \left(\frac{4}{x^2} - \frac{1}{x^3} - \frac{8}{x^4} \right)}{x^2 \left(1 + \frac{9}{x^2} \right)}$

$\frac{\sqrt{0}}{1+0}$

$\frac{0}{1}$

$\textcircled{0}$

$$e) \lim_{x \rightarrow 6} \frac{x^2 - 7x + 6}{x^2 - 36}$$

$$\frac{(x-6)(x-1)}{(x-6)(x+6)}$$

$$\frac{x-1}{x+6}$$

$$\frac{6-1}{6+6}$$

$$\frac{5}{12}$$

$$f) \lim_{x \rightarrow \infty} \frac{6x - 5}{2x + 3}$$

$$\frac{6}{2}$$

$$3$$

$$m) \lim_{x \rightarrow 3^-} \frac{x-3}{|x-3|}$$

$$\frac{-1}{1}$$

$$-1$$

$$n) \lim_{x \rightarrow 0} \frac{(3+x)^2 - 4(3+x) + 3}{x}$$

$$\frac{9+6x+x^2-12-4x+3}{x}$$

$$\frac{2x+x^2}{x}$$

$$2+x$$

$$2+0$$

$$2$$

g)

$$\lim_{x \rightarrow 1} f(x)$$

$$f(x) = \begin{cases} \frac{x+2}{x-2}, & x \in (-\infty, 1) \\ x^3 - 2x^2, & x \in [1, \infty) \end{cases}$$

$$\begin{aligned} \lim_{x \rightarrow 1^-} &= \frac{1+2}{1-2} \\ &= \frac{3}{-1} \\ &= -3 \end{aligned}$$

$$\begin{aligned} \lim_{x \rightarrow 1^+} &= 1^3 - 2(1)^2 \\ &= 1 - 2 \\ &= -1 \end{aligned}$$

$$\lim_{x \rightarrow 1} = \text{D.N.E.}$$

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3. Each of the following functions has a discontinuity, for each, tell what kind of discontinuity it has and where.

a) $f(x) = \frac{x^3 + 1}{x + 1}$

removable @ $x = -1$

b) $f(x) = \frac{|x^2 - x - 20|}{x - 5}$

jump & removable @ $x = 5$

c) $f(x) = \frac{x - 1}{x + 1}$

infinite @ $x = -1$

d) $f(x) = \begin{cases} x + 1, & x \in (-\infty, 2] \\ x^3 - 2x^2, & x \in (2, \infty) \end{cases}$

jump @ $x = 2$

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