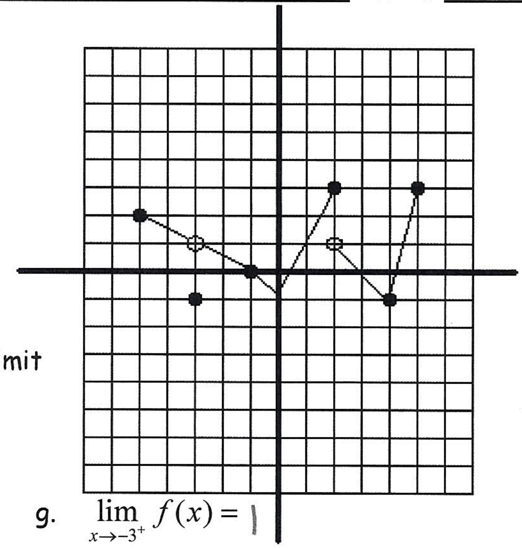
Name ______________________ Date ______________________ Period ________

Mr. Gmerek's Calculus Review of Chapter 2



1. Use the graph of f(x) on the right to find the following. If a limit does not exist, explain why.

a. $\lim_{x\to 0} f(x) = -\frac{1}{2}$

b. $\lim_{x\to 2^-} f(x) = 3$

c. $\lim_{x\to 2^+} f(x) = 1$

d. $\lim_{x\to 2} f(x) =$ DNE the one sided limits are different

e. $\lim_{x\to -1} f(x) = 0$

f. $\lim_{x\to -5^+} f(x) = 2$

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

h. $\lim_{x\to -3^-} f(x) = 1$

i. $\lim_{x\to -3} f(x) = 1$

j. $\lim_{x\to 4} f(x) = -1$

k. $\lim_{x\to 5^-} f(x) = 3$

l. f(-3) = -1

2. Use the graph from problem 1 to determine if the function is continuous at the given point. Include a justification for all answers.

a. x = 4 continuous because $\lim_{x\to 4^-} f(x) = \lim_{x\to 4^+} f(x) = f(4)$

b. x = -3 not continuous because $\lim_{x\to -3^+} f(x) \neq \lim_{x\to -3^-} f(x)$

c. x = 2 not continuous because $\lim_{x\to 2^+} f(x) \neq \lim_{x\to 2^-} f(x)$

3. Find an end behavior model for $f(x) = 8x^4 + 7x^3 - 2x^2 - 3x + 5$.

$f(x) = 8x^4$

4. Let $g(x) = \begin{cases} 4 - x^2 & x < -3 \\ \pi & x = 3 \\ 2 + x & x > -3 \end{cases}$ Find the following limits.

a. $\lim_{x\to -3^-} f(x) = -5$

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

c. $\lim_{x\to -3} f(x) =$ DNE

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5. f(x) and g(x) are defined for all x and:

$$\lim_{x\to c} f(x) = 8 \quad and \quad \lim_{x\to c} g(x) = -6$$

State whether the following are true or false:

a. $\lim_{x\to c} \frac{1}{2} f(x) = 4$ true

b. $\lim_{x\to c} \frac{2-g(x)}{f(x)} = 1$ true

c. $\lim_{x\to c} \frac{f(x)+g(x)}{g(x)} = -\frac{7}{3}$ false

d. $\lim_{x\to c} 4f(x)g(x) = -24$ false

e. $\lim_{x\to c} f(x) - g(x) = 14$ true

6. Find $\lim_{x\to -4^+} \frac{4x-6}{2x^2+5x-12}$.

$\lim_{x\to -4^+} \frac{2(2x-3)}{(2x-3)(x+4)} = \frac{2}{x+4} \xrightarrow[x\to -4^+]{} \infty$

7. Find $\lim_{x\to 0} \frac{\sin(2x)}{x\cos x}$.

$2\lim_{x\to 0} \frac{\sin(2x)}{2x\cos x} = 2\lim_{x\to 0} \frac{\sin(2x)}{2x} \cdot \frac{1}{\cos x} \xrightarrow[x\to 0]{} 2\cdot 1\cdot 1$

$= 2$

8. Find the following limits algebraically. If the limit does not exist, write DNE and explain why it does not exist.

a. $\lim_{x\to 4} (x^2 - 7x + 11)^{50}$ 1

just plug in 4!

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

$= \lim_{x\to -1} \frac{2x(x-1)\cancel{(x+1)}}{\cancel{x+1}} \xrightarrow[x\to -1]{} 4$

c. $\lim_{x\to -\infty} \frac{2x^2+7x-4}{2x^3-x+1} \longrightarrow \frac{2x^2}{2x^3} = \frac{1}{x} \xrightarrow[x\to -\infty]{} 0$

d. $\lim_{x\to 0} x^3 \sin\frac{1}{x}$

$-x^3 \le x^3 \sin\frac{1}{x} \le x^3$

$x\to 0$: $-x^3 \to 0$, $x^3 \to 0$

$\therefore x^3 \sin\frac{1}{x} \to 0$

e. $\lim_{x\to \infty} \frac{8x^2+5x+1}{7x^2+4x}$ $\frac{8}{7}$

f. $\lim_{x\to 0} \frac{2\sin(5x)}{x} = 2\lim_{x\to 0} \frac{5\sin(5x)}{5x} \xrightarrow[x\to 0]{} 10$

g. $\lim_{x\to \infty} \frac{12\sin x}{5x} = \frac{12}{5} \cdot \frac{\sin x}{x} \xrightarrow[x\to \infty]{} 0$

h. $\lim_{x\to 0} \frac{81-(x+9)^2}{3x}$

$= \frac{81-(x^2+18x+81)}{3x} = \frac{-x^2-18x}{3x}$

$= \frac{-x-18}{3} \xrightarrow[x\to 0]{} -6$