

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### MCV4U: Limits Homework

1) Evaluate the limits:

a)  $\lim_{x \rightarrow 0} \frac{x + x^2}{3x}$

b)  $\lim_{x \rightarrow 4} \frac{x^2 - 16}{3x - 12}$

c)  $\lim_{x \rightarrow 5} \frac{5x(5 - x)}{3x - 15}$

d)  $\lim_{x \rightarrow 0} \frac{4x - \sqrt{x}}{3\sqrt{x}}$

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2) Evaluate the limits:

a)  $\lim_{x \rightarrow 0} \frac{x^2 + x - 6}{x - 2}$

b)  $\lim_{x \rightarrow -2} \frac{x^2 + x - 6}{x - 2}$

c)  $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x - 2}$

d)  $\lim_{x \rightarrow -3} \frac{x^2 + x - 6}{x + 3}$

e)  $\lim_{x \rightarrow 3} \frac{x^2 + x - 6}{x + 3}$

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3) Evaluate the limits:

a)  $\lim_{x \rightarrow -2} \frac{x^3 + 8}{x + 2}$

b)  $\lim_{x \rightarrow 1/2} \frac{8x^3 - 1}{1 - 5x + 6x^2}$

c)  $\lim_{x \rightarrow -2} \frac{2x^4 - 32}{x + 2}$

d)  $\lim_{x \rightarrow 1} \frac{x^2 - 2x + 1}{x^3 - x}$

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4) Evaluate the limits:

a)  $\lim_{x \rightarrow 2} \frac{\frac{1}{x} - \frac{1}{2}}{x - 2}$

b)  $\lim_{x \rightarrow 3} \frac{\frac{1}{x-4} + 1}{x-3}$

c)  $\lim_{x \rightarrow 0} \frac{\frac{1}{a} - \frac{1}{x+a}}{x}$

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5) Evaluate the limits, if they exist:

a)  $\lim_{x \rightarrow 0} \frac{\sqrt{x}}{\sqrt{x} + x}$

b)  $\lim_{x \rightarrow 0} \frac{x}{1 + \sqrt{1 + x^2}}$

c)  $\lim_{x \rightarrow 1} \frac{\sqrt{x+8} - 3}{x-1}$

d)  $\lim_{x \rightarrow 0} \frac{\sqrt{x+3} - \sqrt{3}}{x}$

e)  $\lim_{x \rightarrow 3} \frac{3 - \sqrt{3x}}{3 - x}$

f)  $\lim_{x \rightarrow 0} \frac{\sqrt{x} - x}{\sqrt{x}}$

g)  $\lim_{x \rightarrow \sqrt{5}} \frac{x^2 - 5}{x - \sqrt{5}}$

h)  $\lim_{x \rightarrow 9} \frac{\frac{1}{3} - \frac{1}{\sqrt{x}}}{x - 9}$

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6) If  $f(x) = 3x^2 - 2x + 4$ , find

a)  $\lim_{h \rightarrow 0} \frac{f(h) - f(0)}{h}$

b)  $\lim_{h \rightarrow 1} \frac{f(h) - f(1)}{h - 1}$

c)  $\lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h}$

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7) Given  $f(x) = ax^2 + bx + c$ , show that

$$\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = 2ax + b$$