

Name _____

Date _____

Ms. Schmidt

Pre-Calculus

Test 12 Review Answer Sheet

1a) -2	1b) DNE
1c) -1	1d) 3
1e) DNE	1f) DNE
1g) DNE	1h) -1
1i) -1	1j) X
1k) -4	1l) 1
2a) $f(a) = (2-3)^2 = 1$ $\lim_{x \rightarrow 2^-} -x+1 = \lim_{x \rightarrow 2^+} (2-3)^2 = 1$ $\lim_{x \rightarrow 2} \text{DNE}$ NO!	2b) $f(1) = 1$ $\lim_{x \rightarrow 1^-} \frac{3}{1-2} + 4 = -3 + 4 = 1$ $\lim_{x \rightarrow 1^+} \sqrt{1} = 1$ $\lim_{x \rightarrow 1} = 1$ $f(1) = \lim_{x \rightarrow 1} \checkmark$ Yes
3a) $\frac{1}{4}(2)^3 = K(2)^2$ $\frac{2}{4} = \frac{4K}{4}$ $\frac{1}{2} = K$	3b) $K\sqrt{3+1} = 5-3$ $\frac{2K}{2} = \frac{2}{2}$ $K = 1$

4a)

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

$$\lim_{x \rightarrow 3} 3^2 + 2(3) - 1 = \textcircled{14}$$

4b)

$$\lim_{x \rightarrow -2} \frac{1}{2}x^3 - 5x$$

$$\frac{1}{2}(-2)^3 - 5(-2)$$

$$-4 + 10$$

$$\textcircled{6}$$

5a)

$$\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x^2 - 2x} = \frac{0}{0}$$

$$\frac{(x+6)(x-2)}{x(x-2)} = \frac{x+6}{x}$$

$$\lim_{x \rightarrow 2} \frac{x+6}{x} = \frac{2+6}{2} = \frac{8}{2} = \textcircled{4}$$

5b)

$$\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = \frac{0}{0}$$

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

$$\lim_{x \rightarrow 1} x+1 = 1+1 = \textcircled{2}$$

6a)

$$\lim_{x \rightarrow 3} \frac{\sqrt{x+22} - 5}{x-3} = \frac{0}{0}$$

$$\frac{\sqrt{x+22} - 5 (\sqrt{x+22} + 5)}{x-3 (\sqrt{x+22} + 5)}$$

$$\frac{x+22-25}{x-3(\sqrt{x+22}+5)} = \frac{x-3}{x-3(\sqrt{x+22}+5)}$$

$$\lim_{x \rightarrow 3} \frac{1}{\sqrt{x+22}+5} = \frac{1}{5+5} = \left(\frac{1}{10}\right)$$

6b)

$$\lim_{x \rightarrow 2} \frac{2 - \sqrt{x+2}}{x-2} = \frac{0}{0}$$

$$\frac{2 - \sqrt{x+2} (2 + \sqrt{x+2})}{x-2 (2 + \sqrt{x+2})}$$

$$\frac{4 - (x+2)}{x-2(2+\sqrt{x+2})} = \frac{2-x}{x-2(2+\sqrt{x+2})}$$

$$\lim_{x \rightarrow 2} \frac{-1}{2+\sqrt{x+2}} = \frac{-1}{2+2} = \left(\frac{-1}{4}\right)$$

7a)

$$\lim_{x \rightarrow \infty} \frac{2x^4 - x^2 + 18x}{-5x^4 + 7} \rightarrow \frac{2x^4}{-5x^4}$$

4 = 4

$$\lim_{x \rightarrow \infty} = -\frac{2}{5}$$

7b)

$$\lim_{x \rightarrow \infty} \frac{4x^2 + x^6}{1 - 5x^3} = \frac{x^6}{-5x^3}$$

6 > 3

$$\lim_{x \rightarrow \infty} (-\infty)$$

7c)

$$\lim_{x \rightarrow -\infty} \frac{x^2 - 5x - 9}{2x^4 + 3x} = \frac{x^2}{2x^4} \quad 2 < 4$$

$$\lim_{x \rightarrow -\infty} = 0$$

8a)

$$f'(x) = \lim_{h \rightarrow 0} \frac{[(x+h)^2 + 2(x+h) - 3] - [x^2 + 2x - 3]}{h}$$

$$\frac{x^2 + 2xh + h^2 + 2x + 2h - 3 - x^2 - 2x + 3}{h}$$

h

$$\frac{2xh + h^2 + 2h}{h}$$

~~h~~

$$\lim_{h \rightarrow 0} 2x + h + 2 = 2x + 2$$

$$f'(2) = 2(2) + 2 = \textcircled{6} \quad f(2) = 5$$

Tangent

$$y - 5 = 6(x - 2)$$

Normal

$$y - 5 = -\frac{1}{6}(x - 2)$$

8b)

$$f'(x) = \lim_{h \rightarrow 0} \frac{3(x+h)^2 - 4(x+h) + 2 - (3x^2 - 4x + 2)}{h}$$

$$\frac{3x^2 + 6xh + 3h^2 - 4x - 4h + 2 - 3x^2 + 4x - 2}{h}$$

h

$$\frac{6xh + 3h^2 - 4h}{h}$$

~~h~~

$$\lim_{h \rightarrow 0} 6x + 3h - 4 = 6x - 4$$

$$f'(3) = 6(3) - 4 = \textcircled{14} \quad f(3) = 17$$

Tangent

$$y - 17 = 14(x - 3)$$

Normal

$$y - 17 = -\frac{1}{14}(x - 3)$$

9a)

$$\left(\frac{1}{2}\right)^{x+2} = 8^{3x+6}$$

$$(2^{-1})^{x+2} = (2^3)^{3x+6}$$

$$-1(x+2) = 3(3x+6)$$

$$-x - 2 = 9x + 18$$

$$+x - 18 \quad +x - 18$$

$$\frac{-20}{10} = \frac{10x}{10}$$

$$-2 = x$$

9b)

$$\left(\frac{1}{9}\right)^{x-2} = \left(\frac{1}{27}\right)^{2x-1}$$

$$(3^{-2})^{x-2} = (3^{-3})^{2x-1}$$

$$-2(x-2) = -3(2x-1)$$

$$-2x + 4 = -6x + 3$$

$$+6x - 4 \quad +6x - 4$$

$$4x = -1$$

$$x = -\frac{1}{4}$$

10a)

$$\log_3(x+24) + \log_3 x = 4$$

$$\log_3(x+24)x = 4$$

$$3^4 = (x+24)x$$

$$81 = x^2 + 24x$$

$$0 = x^2 + 24x - 81$$

$$(x+27)(x-3) = 0$$

$$x = -27 \quad x = 3$$

doesn't work!

10b)

$$\log_2(x-5) + \log_2(x-9) = 5$$

$$\log_2(x-5)(x-9) = 5$$

$$2^5 = (x-5)(x-9)$$

$$32 = x^2 - 14x + 45$$

-32 -32

$$0 = x^2 - 14x + 13$$

$$0 = (x-13)(x-1)$$

$$x = 13 \quad x = 1$$

doesn't work!

11a)

$$\frac{(a) \frac{a}{b} - \frac{b}{(a)} (b)}{(a) \frac{a}{b} + \frac{b}{(a)} (b)} = \frac{a^2 - b^2}{ab}$$

$$\frac{\frac{b}{b} \cdot 1 + \frac{a}{b}}{\frac{b+a}{b}}$$

$$\frac{a^2 - b^2}{ab} \cdot \frac{b}{b+a} = \frac{(a-b)}{(a+b)} \cdot \frac{b}{b+a}$$

$$\frac{a+b}{a}$$

11b)

$$\frac{2 \cdot \frac{x}{2} + \frac{1}{2}}{2 \cdot \frac{x}{2} - \frac{1}{2}} = \frac{2x+1}{2}$$

$$\frac{4 \cdot \frac{x^2}{4} - \frac{1}{4}}{4 \cdot \frac{x^2}{4} - \frac{1}{4}} = \frac{4x^2-1}{4}$$

$$\frac{2x+1}{2} \cdot \frac{4}{(2x+1)(2x-1)} = \frac{2}{2x-1}$$