

10 POINTS

Limits Gateway Practice

Name ANSWERS

1 2 3 4 5 6 7

$$\frac{5}{9} \quad 1) \lim_{x \rightarrow \infty} \frac{5x^2 + 3x + 17}{9x^2 - 4x + 8} = \frac{5}{9}$$

$$\frac{1}{12} \quad 2) \lim_{x \rightarrow 12} \frac{2x - 24}{x^2 - 144} = \lim_{x \rightarrow 12} \frac{2(x-12)}{(x-12)(x+12)} = \frac{2}{24} = \frac{1}{12}$$

$$\frac{2}{3} \quad 3) \lim_{x \rightarrow 0^+} \frac{|2x|}{3x} = \lim_{x \rightarrow 0^+} \frac{2}{3} \left(\frac{|x|}{x} \right) = \frac{2}{3}$$

$$\sqrt{5} \quad 4) \lim_{x \rightarrow \infty} \frac{\sqrt{7+5x^2}}{3+x} = \lim_{x \rightarrow \infty} \frac{\sqrt{5x^2}}{x} = \lim_{x \rightarrow \infty} \frac{\sqrt{5}|x|}{x}$$

$$-12 \quad 5) \lim_{\Delta x \rightarrow 0} \frac{(4-3\Delta x)^2 - 16}{2\Delta x} = \lim_{\Delta x \rightarrow 0} \frac{(16 - 24\Delta x + 9\Delta x^2) - 16}{2\Delta x} = \lim_{\Delta x \rightarrow 0} (-12 + \frac{9}{2}\Delta x) = -12$$

$$0 \quad 6) \lim_{x \rightarrow 5} \frac{(x-5)^2}{5-x} = \lim_{x \rightarrow 5} \frac{(x-5)(x-5)}{-(x-5)} = 0$$

$$\frac{2}{b^2} \quad 7) \text{ If } b \neq 0, \text{ then } \lim_{x \rightarrow b} \frac{8x^2 - 8b^2}{2(x^4 - b^4)} = \lim_{x \rightarrow b} \frac{4(x^2 - b^2)}{(x^2 + b^2)(x^2 - b^2)} = \frac{4}{2b^2} = \frac{2}{b^2}$$

$$48 \quad 8) \lim_{x \rightarrow 4} \frac{x^3 - 64}{x - 4} = \lim_{x \rightarrow 4} \frac{(x-4)(x^2 + 4x + 16)}{(x-4)} = 48$$

$$\frac{9}{2} \quad 9) \lim_{x \rightarrow 0} \frac{\sin 9x}{2x} = \lim_{x \rightarrow 0} \left(\frac{9 \sin 9x}{2(9x)} \right) = \frac{9}{2}$$

$$0 \quad 10) \lim_{x \rightarrow \infty} \frac{3x^2 + 6x + 7}{4x^3 - 3x + 8} = \lim_{x \rightarrow \infty} \frac{3}{4x} = 0$$

#4

- $\sqrt{x^2} = |x|$
- $(\sqrt{x})^2 = x, x \geq 0$

CHECK THESE OUT ON YOUR TI-84

- $y_1 = \sqrt{x^2}$
- $y_2 = (\sqrt{x})^2$

#5

$$(a-b)^2 = a^2 - 2ab + b^2$$

#2

$$a^2 - b^2 = (a-b)(a+b)$$

#8

- $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$
- $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$