

Graded Assignment 1

$$1. \lim_{x \rightarrow -6} f = \boxed{1} \quad (a)$$

$$2. \lim_{x \rightarrow 0^+} f = \boxed{0} \quad (d)$$

$$3. \lim_{x \rightarrow 0} f \quad \text{No lim at Right} \neq \text{Left}$$

$$\lim_{x \rightarrow 0^+} f \neq \lim_{x \rightarrow 0^-} f$$

$$4. \lim_{x \rightarrow 3^-} f = 2 \quad (b)$$

$$5. \lim_{x \rightarrow 0} \frac{\sin 4x}{2x} \quad \text{Using L'Hopital's rule}$$

$$\lim_{x \rightarrow 0} \frac{\frac{d}{dx} \sin 4x}{\frac{d}{dx} 2x} = \frac{\sin 4x}{2}$$

$$= \boxed{2}$$

$$6 \lim_{x \rightarrow 0} \sin \frac{5x}{2x^2 - x} \quad \frac{\frac{d}{dx} \sin 5x}{\frac{d}{dx} (2x^2 - x)} = \frac{5 \cos(5x)}{4x - 1}$$

$$= -5 // (c)$$

$$7. \lim_{x \rightarrow 1^-} \frac{1}{x-1}$$

$$= \infty (e)$$

Limit does not exist

$$8. \lim_{x \rightarrow \infty} \frac{x}{(x-5)(x+7)}$$

$$= \lim_{x \rightarrow \infty} \frac{1}{\left(1 - \frac{5}{x}\right)\left(1 + \frac{7}{x}\right)}$$

$$= 1$$

$$\left(1 + \frac{0}{x}\right)\left(1 + \frac{0}{x}\right)$$

$$= 1 (a)$$

$$9. \lim_{x \rightarrow \infty} \frac{x}{(x-5)(x+7)}$$

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

$$= \frac{x}{x^2 - x - 6}$$

$$\frac{x}{x^2 + 2x - 3x - 6} \quad \frac{x}{x^2 - x - 6}$$

$$\infty (e)$$

$$10] \lim_{x \rightarrow \infty} \frac{3x^4 - 5x^3 + 709}{7x^4 + 9x^2 + 11}$$

Divide by highest power of x

$$\lim_{x \rightarrow \infty} \frac{3 - \frac{5}{x} + \frac{709}{x^4}}{7 + \frac{9}{x^2} + \frac{11}{x^4}}$$

Substitute with ∞

$$\lim_{x \rightarrow \infty} \frac{3}{7} \text{ (b)}$$

11. Asymptote $y = -\frac{1}{a}$ horizontal

$$\text{Function } \frac{x^3}{1-2x^3} \text{ (a)}$$

$$12. \lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x-3}$$

Simplify $= \frac{-1}{3x}$ plug in 3

$$= \frac{-1}{9} \text{ (b)}$$

131) $\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{x}$

Rationalize $f(x) = \frac{1}{\sqrt{x+9} + 3}$

Substitute 0 for limit

$$\frac{1}{\sqrt{0+9} + 3} = \frac{1}{3+3} = \boxed{\frac{1}{6} \text{ (e)}}$$

14] $f(x) = \sqrt{x+2}$ $\text{deriv} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

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