

*Ch9:

Math2351

-Sec 9.1: limits

$$\boxed{20} \lim_{x \rightarrow \frac{1}{3}} \frac{1-3x}{9x^2+1} = \frac{1-3(\frac{1}{3})}{9(\frac{1}{3})^2+1} = \frac{1-1}{1+1} = \frac{0}{2} = 0$$

$$\boxed{24} \lim_{x \rightarrow -5} \frac{x^2+8x+15}{x^2+5x} = \frac{(-5)^2+8(-5)+15}{(-5)^2+5(-5)} = \frac{25-40+15}{25-25} = \frac{0}{0} \text{ (factor it)}$$

$$\begin{aligned} \hookrightarrow \lim_{x \rightarrow -5} \frac{x^2+8x+15}{x^2+5x} &= \lim_{x \rightarrow -5} \frac{(x+3)(x+5)}{x(x+5)} = \lim_{x \rightarrow -5} \frac{x+3}{x} \\ &= \frac{-5+3}{-5} = \frac{-2}{-5} = \frac{2}{5} \end{aligned}$$

$$\boxed{30} \lim_{x \rightarrow 5} f(x) \text{ where } f(x) = \begin{cases} 7x-10 & \text{if } x < 5 \\ 25 & \text{if } x \geq 5 \end{cases}$$

$$\lim_{x \rightarrow 5^+} f(x) = \lim_{x \rightarrow 5^+} (25) = \underline{25}$$

$$\begin{aligned} \lim_{x \rightarrow 5^-} f(x) &= \lim_{x \rightarrow 5^-} (7x-10) = 7(5)-10 \\ &= 35-10 = \underline{25} \end{aligned}$$

$$\bullet \lim_{x \rightarrow 5^+} f(x) = \lim_{x \rightarrow 5^-} f(x) \longrightarrow \boxed{\lim_{x \rightarrow 5} f(x) = 25}$$

$$\boxed{34} \lim_{x \rightarrow 5} \frac{x^2-6x+8}{x-5} = \frac{5^2-6(5)+8}{5-5} = \frac{25-30+8}{0} = \frac{3}{0} \text{ "DNE"}$$