

WORKSHOP WEEK 3 CALCULUS

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$$(21) \lim_{x \rightarrow 0} \frac{\arcsin x}{x} = \lim_{x \rightarrow 0} \frac{1}{\sqrt{1-x^2}} = 1$$

$$(23) \lim_{x \rightarrow \infty} \frac{3x^2 - 2x + 1}{2x^2 + 3} = \lim_{x \rightarrow \infty} \frac{6x - 2}{4x} = \lim_{x \rightarrow \infty} \frac{6}{4} = \boxed{\frac{3}{2}}$$

$$(25) \lim_{x \rightarrow \infty} \frac{x^2 + 2x + 3}{x - 1} = \lim_{x \rightarrow \infty} \frac{2x + 2}{1} = \infty$$

$$(27) \lim_{x \rightarrow \infty} \frac{x^3}{e^{x/2}} = \lim_{x \rightarrow \infty} \frac{3x^2}{e^{x/2}(\frac{1}{2})} = \lim_{x \rightarrow \infty} \frac{6x}{e^{x/2}(\frac{1}{2})(\frac{1}{2})} = \lim_{x \rightarrow \infty} \frac{6}{e^{x/2}(\frac{1}{2})(\frac{1}{2})} = 0$$

$$(39) \lim_{x \rightarrow \infty} x \sin\left(\frac{1}{x}\right) = (\infty)(0)$$

$$\lim_{x \rightarrow \infty} \frac{\sin\left(\frac{1}{x}\right)}{\frac{1}{x}} = \lim_{x \rightarrow \infty} \frac{\cos\left(\frac{1}{x}\right)\left(-\frac{1}{x^2}\right)}{\left(-\frac{1}{x^2}\right)} = \lim_{x \rightarrow \infty} \cos\left(\frac{1}{x}\right) = 1$$

$$(47) \lim_{x \rightarrow 0^+} [3(x)^{x/2}] = 0^0 \rightarrow \ln y = \lim_{x \rightarrow 0^+} \ln 3 + \lim_{x \rightarrow 0^+} \frac{1/x}{-2/x^2}$$

$$y = \lim_{x \rightarrow 0^+} 3(x)^{x/2}$$

$$\ln y = \lim_{x \rightarrow 0^+} \ln 3 - \lim_{x \rightarrow 0^+} \frac{x}{2}$$

$$\ln y = \lim_{x \rightarrow 0^+} \ln[3(x)^{x/2}]$$

$$\ln y = \ln 3 \rightarrow y = 3$$

$$\ln y = \lim_{x \rightarrow 0^+} \left[\frac{\ln 3 + x \ln x}{2} \right]$$

$$\lim_{x \rightarrow 0^+} [3(x)^{x/2}] = 3$$

$$\ln y = \lim_{x \rightarrow 0^+} \left[\ln 3 + \frac{\ln x}{2/x} \right]$$

