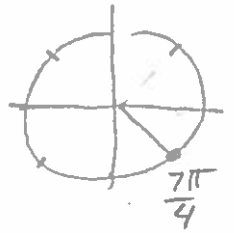


Chapter 10

MATH 200

$$\begin{aligned} (10) \quad \lim_{x \rightarrow \frac{7\pi}{4}} \cos(x) \sin(x) &= \cos\left(\frac{7\pi}{4}\right) \sin\left(\frac{7\pi}{4}\right) \\ &= \frac{\sqrt{2}}{2} \left(-\frac{\sqrt{2}}{2}\right) = -\frac{2}{4} = \boxed{-\frac{1}{2}} \end{aligned}$$



$$(12) \quad \lim_{x \rightarrow \pi} \frac{x \cos(x) + x}{\cos(x) + 1} = \lim_{x \rightarrow \pi} \frac{x(\cos(x) + 1)}{\cos(x) + 1} = \lim_{x \rightarrow \pi} x = \boxed{\pi}$$

$$\begin{aligned} (16) \quad \lim_{\theta \rightarrow 0} \frac{1 - \cos(\theta)}{\sin(2\theta)} &= \lim_{\theta \rightarrow 0} \frac{1 - \cos(\theta)}{2\theta} \frac{2\theta}{\sin(2\theta)} \\ &= \frac{1}{2} \lim_{\theta \rightarrow 0} \frac{1 - \cos(\theta)}{\theta} \frac{1}{\frac{\sin(2\theta)}{2\theta}} = \frac{1}{2} (0) \left(\frac{1}{1}\right) = \boxed{0} \end{aligned}$$

[Here we used $\lim_{\theta \rightarrow 0} \frac{1 - \cos(\theta)}{\theta} = 0$ and $\lim_{\theta \rightarrow 0} \frac{\sin(\theta)}{\theta} = 1$]

$$\begin{aligned} (24) \quad \lim_{\theta \rightarrow 0} \frac{1}{\theta} \tan(3\theta) &= \lim_{\theta \rightarrow 0} \frac{1}{\theta} \frac{\sin(3\theta)}{\cos(3\theta)} \\ &= 3 \lim_{\theta \rightarrow 0} \frac{\sin(3\theta)}{3\theta} \frac{1}{\cos(3\theta)} = 3 \cdot 1 \cdot \frac{1}{\cos(0)} = \boxed{3} \end{aligned}$$

$$\begin{aligned} (28) \quad \lim_{x \rightarrow 0} \frac{\sin(7x)}{5x} &= \frac{7}{5} \lim_{x \rightarrow 0} \frac{\sin(7x)}{7x} \\ &= \frac{7}{5} \cdot 1 = \boxed{\frac{7}{5}} \end{aligned}$$