7. $\lim _{x \rightarrow 1} \frac{x^{9}-1}{x^{5}-1}=\lim _{x \rightarrow 1} \frac{9 x^{8}}{5 x^{4}}=\frac{9}{5}$

$$
\text { 9. } \begin{aligned}
& \lim _{x \rightarrow(\pi / 2)^{+}} \frac{\cos x}{1-\sin x} \\
= & \lim _{x \rightarrow \frac{\pi}{2}^{+}} \frac{\oplus+\sin x}{\Theta^{+\cos x}}=-\infty
\end{aligned}
$$

13. 

$$
\begin{aligned}
\lim _{x \rightarrow 0} \frac{\tan p x}{\tan q x}= & \lim _{x \rightarrow 0} \frac{p \cdot \sec ^{2} p x}{q \cdot \sec ^{2} q x}=\frac{p}{q} \\
& x \rightarrow 0, \sec ^{2} x \Rightarrow 1
\end{aligned}
$$

11. $\lim _{t \rightarrow 0} \frac{e^{t}-1}{t^{3}}=\lim _{t \rightarrow 0} \frac{e^{t}}{3 t^{2}}=\infty$
12. $\lim _{x \rightarrow 0} \frac{e^{x}-1-x}{x^{2}}$

$$
=\lim _{x \rightarrow 0} \frac{e^{x}-1}{2 x}=\lim _{x \rightarrow 0} \frac{e^{x}}{2}=\frac{1}{2}
$$

17. $\lim _{\substack{x \rightarrow 0^{+} \\ y=\ln ^{2}}} \ln \rightarrow 0^{+}=-\infty$
$\underbrace{4}$
18. $\lim _{x \rightarrow \infty} \frac{e^{x}}{x^{3}}=\lim _{x \rightarrow \infty} \frac{e^{x}}{3 x^{2}}$

$$
=\lim _{x \rightarrow \infty} \frac{e^{x}}{6 x}=\lim _{x \rightarrow \infty} \frac{e^{x}}{6}=\infty
$$

26. $\lim _{x \rightarrow 0} \frac{\sin x-x}{x^{3}}$

$$
\begin{aligned}
& \text { 25. } \lim _{t \rightarrow 0} \frac{5^{t}-3^{t}}{t} \\
& \begin{aligned}
=\lim _{t \rightarrow 0} \frac{5^{t} \ln 5-3^{t} \ln 3}{1} & =\ln 5-\ln 3 \\
& =\ln \left(\frac{5}{3}\right)
\end{aligned}
\end{aligned}
$$

40. 

$$
\left.\begin{array}{rl}
\lim _{x \rightarrow-\infty} x^{2} e^{x} & =\lim _{x \rightarrow \infty}(-x)^{2} e^{-x} \\
= & \lim _{x \rightarrow \infty} \frac{(-x)^{2}}{e^{x}}
\end{array}=\lim _{x \rightarrow \infty} \frac{2(-x)(-1)}{e^{x}}\right)=\lim _{x \rightarrow \infty} \frac{2}{e^{x}}=0
$$

$$
\begin{aligned}
& \lim _{x \rightarrow \infty}\left(1+\frac{1}{x}\right)^{x}, k \\
& \left(1+\frac{1}{x}\right)^{x}=k \\
& \ln \left(1+\frac{1}{x}\right)^{x}=\ln k
\end{aligned}
$$

