Determine the value of each limit, if it exists. MUST SHOW ALL WORK.

a. $\lim_{x\to 0}\frac{\sin 5x}{x}$ $\cdot\frac{5}{5} = 5\cdot\frac{\sin 5x}{5x} = 5\cdot 1 = 5$

b. $\lim_{x\to 0}\frac{\sin 6x}{\cos 4x}$ $\cdot\frac{6x}{6x} = \frac{\sin 6x}{6x}\cdot\frac{6x}{\cos 4x}$

$= \frac{6(0)}{\cos(0)} = \frac{0}{1} = 0$

c. $\lim_{x\to 0}\frac{\tan x}{4x} = \frac{\frac{\sin x}{\cos x}}{4x} = \frac{\sin x}{\cos x}\cdot\frac{1}{4x}$

$= \frac{1}{4}\cdot\frac{\sin x}{x}\cdot\frac{1}{\cos x}$

$= \frac{1}{4}\cdot 1\cdot\frac{1}{\cos 0} = \frac{1}{4}\cdot 1\cdot 1 = \frac{1}{4}$

d. $\lim_{x\to 0}\frac{\sin^3 2x}{\sin^3 3x}$ $= \left(\frac{3x}{3x}\right)\left(\frac{\sin 2x}{\sin 3x}\right)\left(\frac{2x}{2x}\right)\left(\frac{3x}{3x}\right)\left(\frac{\sin 2x}{\sin 3x}\right)\left(\frac{2x}{2x}\right)\left(\frac{3x}{3x}\right)\left(\frac{\sin 2x}{\sin 3x}\right)\left(\frac{2x}{2x}\right)$

$= \frac{2x}{3x}\cdot\frac{2x}{3x}\cdot\frac{2x}{3x}$

$= \frac{2}{3}\cdot\frac{2}{3}\cdot\frac{2}{3} = \frac{8}{27}$

e. $\lim_{x\to 0}\frac{x}{\sin\frac{x}{2}}$ $\cdot\frac{1/2}{1/2}$

$= \frac{x/2}{\frac{1}{2}\sin x/2} = 2\cdot\frac{x/2}{\sin x/2}$

$= 2\cdot 1 = 2$

f. $\lim_{x\to 0}\frac{1-\cos^2 x}{x^2}$ $= \frac{\sin^2 x}{x^2} = \frac{\sin x}{x}\cdot\frac{\sin x}{x}$

$= 1\cdot 1 = 0$

g. $\lim_{x\to 0}\frac{\sin 3x}{x}$ $\cdot\frac{3}{3}$

$= \frac{\sin 3x}{3x}\cdot 3 = 1\cdot 3 = 3$

h. $\lim_{x\to 0}\frac{\sin x}{7x}$ $= \frac{1}{7}\cdot\frac{\sin x}{x} = \frac{1}{7}\cdot 1 = \frac{1}{7}$

i. $\lim_{x\to 0}\frac{\sin 5x}{\sin 6x}$ $\cdot\frac{5x}{5x}\cdot\frac{6x}{6x}$

$= \frac{\sin 5x}{5x}\cdot\frac{6x}{\sin 6x}\cdot\frac{5x}{1}\cdot\frac{1}{6x}$

$= 1\cdot 1\cdot\frac{5x}{6x} = 5/6$

j. $\lim_{x\to 0}\frac{\sin 6x}{6}$ $\cdot\frac{x}{x} = x\cdot\frac{\sin 6x}{6x}$

$= x\cdot 1$

$= 0\cdot 1$

$= 0$

k. $\lim_{x\to 0}\frac{\tan x}{4x}$

Same as letter c

l. $\lim_{x\to 0}\frac{\sin x\cos x}{x}$ $= \frac{\sin x}{x}\cdot\frac{\cos x}{1}$

$= 1\cdot\cos 0$

$= 1\cdot 1 = 1$

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b. $\lim_{x\to 0}\frac{\sin 6x}{\cos 4x}$

c. $\lim_{x\to 0}\frac{\tan x}{4x}$

d. $\lim_{x\to 0}\frac{\sin^3 2x}{\sin^3 3x}$

e. $\lim_{x\to 0}\frac{x}{\sin\frac{x}{2}}$

f. $\lim_{x\to 0}\frac{1-\cos^2 x}{x^2}$

g. $\lim_{x\to 0}\frac{\sin 3x}{x}$

h. $\lim_{x\to 0}\frac{\sin x}{7x}$

i. $\lim_{x\to 0}\frac{\sin 5x}{\sin 6x}$

j. $\lim_{x\to 0}\frac{\sin 6x}{6}$

k. $\lim_{x\to 0}\frac{\tan x}{4x}$

l. $\lim_{x\to 0}\frac{\sin x\cos x}{x}$