Trig limit Practice Problems

1) $\lim_{x\to 0} \frac{\sin 3x}{4} = \frac{0}{4} = \boxed{0}$

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2) $\lim_{x\to 0} \frac{\sin(4x)}{\sin(5x)} = \frac{\sin(4x)\cdot 4x\cdot 5x}{\sin(5x)\cdot 4x\cdot 5x}$

$\lim_{x\to 0} \frac{\sin(4x)}{4x}\cdot\frac{5x}{\sin(5x)}\cdot\frac{4x}{5x} = 1\cdot 1\cdot\frac{4}{5} = \boxed{\frac{4}{5}}$

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3) $\lim_{x\to 0} \frac{x^2-2x}{\sin 3x}$ $\quad \frac{x\cdot(x-2)}{\sin 3x}\cdot\frac{3}{3}$

$\lim_{x\to 0} \frac{3x}{\sin 3x}\cdot\frac{(x-2)}{3} = 1\cdot\frac{(0-2)}{3} = \boxed{-\frac{2}{3}}$

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4) $\lim_{x\to 0} \frac{1-\cos(4x)}{9\cdot x\cdot x}\cdot\frac{1+\cos(4x)}{1+\cos(4x)} = \frac{1-\cos^2(4x)}{9\cdot x\cdot x\cdot(1+\cos(4x))}$

$\lim_{x\to 0} \frac{\sin^2 4x}{9\cdot x\cdot x\cdot(1+\cos 4x)}\cdot\frac{4}{4}\cdot\frac{4}{4} = \lim_{x\to 0}\frac{16}{9(1+\cos 4x)}\cdot\frac{\sin 4x}{4x}\cdot\frac{\sin 4x}{4x}$

$= \frac{16}{9(1+1)}\cdot 1\cdot 1 = \boxed{\frac{8}{9}}$

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

6. $\lim_{x\to 0} \frac{x}{\tan 7x} = \frac{x}{\frac{\sin 7x}{\cos 7x}} = \frac{x}{1} \cdot \frac{\cos(7x)}{\sin(7x)} \cdot \frac{7}{7} = \lim_{x\to 0} \frac{7x}{\sin 7x} \cdot \frac{\cos(7x)}{7}$

$= 1 \cdot \frac{1}{7} = \boxed{\frac{1}{7}}$

7. $\lim_{x\to 0} \frac{\tan 5x}{x(3x+2)} \cdot \frac{5}{5} = \lim_{x\to 0} \frac{\tan 5x}{5x} \cdot \frac{5}{3x+2} = 1 \cdot \frac{5}{2} = \boxed{\frac{5}{2}}$

8. $\lim_{x\to 0} \frac{\frac{1}{\cos x} - 1}{x} = \frac{1 - \cos x}{\cos x \cdot x} = \lim_{x\to 0} \frac{1}{\cos x} \cdot \frac{1-\cos x}{x} = \boxed{0}$

$1 \cdot 0 = 0$

9. $\lim_{x\to -3} \frac{\sin(x+3)}{(x+3)(x+4)} = \lim_{x\to -3} \frac{\sin(x+3)}{(x+3)} \cdot \frac{1}{(x+4)} = 1 \cdot 1 = \boxed{1}$

* remember as long as whatever x goes to makes a zero over zero appear then we can say things like

$$\lim_{x\to -3} \frac{\sin(x+3)}{x+3} = 1$$

10. same as $7\ \frac{5}{2}$

11. $\lim_{x\to 0} \dfrac{x}{\sin x \cos x} = \lim_{x\to 0} \dfrac{1}{\cos x} \cdot \dfrac{x}{\sin x} = 1 \cdot 1 = \boxed{1}$

12. $\lim_{x\to 0} \dfrac{\tan(3x)}{\tan(5x)} \cdot \dfrac{5x \cdot 3x}{5x \cdot 3x} = \dfrac{\tan(3x)}{3x} \cdot \dfrac{5x}{\tan(5x)} \cdot \dfrac{3x}{5x} =$

$\lim_{x\to 0} \dfrac{\tan 3x}{3x} \cdot \dfrac{5x}{\tan(5x)} \cdot \dfrac{3}{5} = \boxed{\dfrac{3}{5}}$

13. $\lim_{x\to 0} \dfrac{\cot(2x)}{\csc(x)} = \dfrac{\frac{\cos(2x)}{\sin(2x)}}{\frac{1}{\sin(x)}} = \dfrac{\cos(2x)}{\sin(2x)} \cdot \dfrac{\sin x}{1} \cdot \dfrac{2x}{2x} \cdot \dfrac{x}{x} \cdot$

$\lim_{x\to 0} \dfrac{\cos(2x)}{1} \cdot \dfrac{2x}{\sin(2x)} \cdot \dfrac{\sin x}{x} \cdot \dfrac{x}{2x} = 1 \cdot 1 \cdot 1 \cdot \frac{1}{2} = \boxed{\frac{1}{2}}$