

Worksheet 6
[Trigonometric Limits]

A. Determine each of the limits given below if the limit exists. If the limit does not exist, say so and justify your answer.

1. $\lim_{x \rightarrow 0} \left(\frac{\sin(3x)}{x} \right)$

2. $\lim_{x \rightarrow 0} \left(\frac{\tan(3x)}{4x} \right)$

3. $\lim_{x \rightarrow 0} \left(\frac{\sin(4x)}{4x^2 - x} \right)$

4. $\lim_{x \rightarrow 0} \left(\frac{1 - \cos(2x)}{x} \right)$

5. $\lim_{x \rightarrow 0} \left(\frac{\tan(3x) \sin(4x)}{\sin(5x) \tan(6x)} \right)$

6. $\lim_{x \rightarrow \frac{\pi}{4}} \left(\frac{\cos x - \sin x}{\frac{\pi}{4} - x} \right)$

7. $\lim_{x \rightarrow 0} \left(\frac{x^2}{1 - \cos x} \right)$

8. $\lim_{x \rightarrow 0} \left(\frac{1 - \cos 3x}{\cos^2 5x - 1} \right)$

9. $\lim_{x \rightarrow 0} \left(\frac{\sin(3x)}{2x} \right)$

10. $\lim_{x \rightarrow 0} \left(\frac{\tan 4x}{\sin 3x} \right)$

11. $\lim_{x \rightarrow 0} \left(\frac{1 - \cos(2x)}{4x^2} \right)$

12. $\lim_{x \rightarrow \infty} \left(\frac{x + \sin x}{x + \cos x} \right)$

13. $\lim_{x \rightarrow \infty} \left(1 + \cos \left(\frac{1}{x} \right) \right)$

14. $\lim_{x \rightarrow 0} \left(\frac{\sin x - \sin x \cos x}{x^2} \right)$

15. $\lim_{x \rightarrow 0} (x \cot x)$

16. $\lim_{x \rightarrow 0} \left(\frac{\sin(\alpha + x) - \sin \alpha}{x} \right)$

17. $\lim_{x \rightarrow 0} \left(\frac{\cos(\alpha + x) - \cos \alpha}{x} \right)$

18. $\lim_{x \rightarrow 0} \left(\frac{\tan(\alpha + x) - \tan \alpha}{x} \right)$