

University of Calgary
 Faculty of Science
 Department of Mathematics and Statistics

Math 251-L10

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