University of Calgary
Faculty of Science
Department of Mathematics and Statistics

Math 249-L05 Fall 2005

Worksheet 6
[Trigonometric Limits; Introduction to derivatives]

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

a. $\lim_{x \to 0} \left(\frac{\sin(3x)}{x} \right)$

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

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

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

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

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

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

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

2. Exercise 2.6, Calculus, Eighth edition, by Anton, Bivens and Davis.

3. Chapter Review Exercises from the text above; Page 162 - 164.

4. Determine the slope of the tangent line to the given curve at the point given in each case:

a. $y = \sin x$ at the point $\left(\frac{\pi}{4}, \frac{1}{\sqrt{2}} \right)$.

b. $y = x^2 - 4x$ at the point $(-1, 5)$.

c. $y = \sqrt{x^2 - 4}$ at the point $(2\sqrt{2}, 2)$.

d. $y = \frac{3x + 4}{2x - 3}$ at the point $(1, -7)$.