

BC Calculus  
Lesson 3.5 part 2

1. Explain why  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ .

2. Use the value of the limit in question 1 and the limit rules to find the value of each limit *analytically*:

a)  $\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$

b)  $\lim_{x \rightarrow 0} \frac{\sin(9x)}{\sin(7x)}$

c)  $\lim_{x \rightarrow 0} \frac{\sin^3 x}{x^2}$

d)  $\lim_{x \rightarrow 0} \frac{\sin^5(2x)}{4x^5}$

e)  $\lim_{x \rightarrow 0} \frac{x}{\cos x}$

f)  $\lim_{z \rightarrow 0} \frac{1 - \cos(2z)}{4z}$

g)  $\lim_{x \rightarrow 0} \frac{1 - \cos x}{1 + \sin x}$

h)  $\lim_{x \rightarrow 0} \frac{\tan^4(2x)}{4x^4}$

i)  $\lim_{x \rightarrow \frac{\pi}{2}} \frac{1 - \sin x}{\frac{1}{2}\pi - x}$

j)  $\lim_{x \rightarrow \pi^+} \frac{\tan x}{x - \pi}$

k)  $\lim_{x \rightarrow 0} \frac{x^2 + 3x}{\sin x}$

l)  $\lim_{x \rightarrow 0} \frac{\sin x}{3x^2 + 2x}$

m)  $\lim_{t \rightarrow 0^+} \frac{\sin t}{t^2}$

n)  $\lim_{x \rightarrow 0} x \cos \frac{1}{x}$