PDF 5.010 Trig Derivatives Introduction

The two main rules to remember are the following:

$\frac{d(\sin x)}{dx} = \cos x$ and $\frac{d(\cos x)}{dx} = -\sin x$ (a proof of the first rule is in the powerpoint; the other proof is similar)

Determine the derivatives of each of the following with respect to x:

a) $y = \cos x$

b) $y = x \sin x$

c) $y = \sin x^2$

d) $y = sin^2 x$

e) $y = \cos(1 + x^3)$

f) $y = \tan x$

g) $y = \cot x$

h) $y = \csc x$

i) $y = \sec x$

In summary, the derivatives of the six trig functions are as follows:

$$y = \sin x \rightarrow y' = \cos x$$

$$y = \cos x \rightarrow y' = -\sin x$$

$$y = \tan x \rightarrow y' = sec^2 x$$

$$y = \csc x \rightarrow y' = -cot\, x\, csc\, x$$

$$y = \sec x \rightarrow y' = \tan x \sec x$$

$$y = \cot x \rightarrow y' = -csc^2 x$$

Part 2

Determine the derivatives of each of the following:

j) $y = \sin x \cos x$

k) $y = \sin x\, cos^2 x$

l) $y = \sin(\cos x)$

m) $y = \tan x\, sin^2(\cos 2x)$

n) $y = \csc(4x^2 - 5x + 1)$