

Applications of Trigonometric Functions (Part 1)

Date:

Derivatives of Trigonometric Functions

$$\frac{d(\sin x)}{dx} = \cos x \qquad \frac{d(\csc x)}{dx} = -\csc x \cot x$$

$$t \quad \frac{d(\cos x)}{dx} = -\sin x \qquad \frac{d(\sec x)}{dx} = \sec x \tan x$$

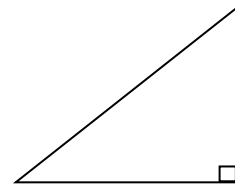
$$\frac{d(\tan x)}{dx} = \sec^2 x \qquad \frac{d(\cot x)}{dx} = -\csc^2 x$$

Example 1: Optimizations of Trigonometric functions

The position of a particle as it moves horizontally is described by the equation $s = 2\sin t - \cos t, 0 \leq t \leq 2\pi$ where s is the displacement in metres and t is the time in seconds. Find the maximum and minimum displacement.

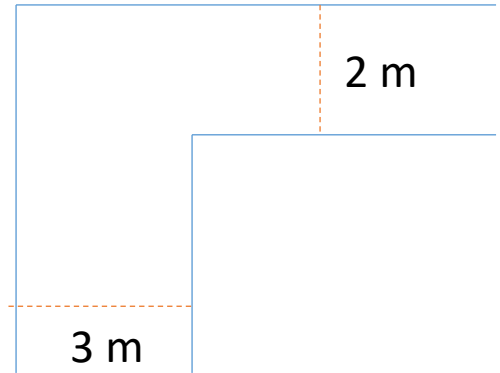
Example 2: Optimizations of Trigonometric functions

Find the maximum perimeter of a right triangle with hypotenuse 20 cm.



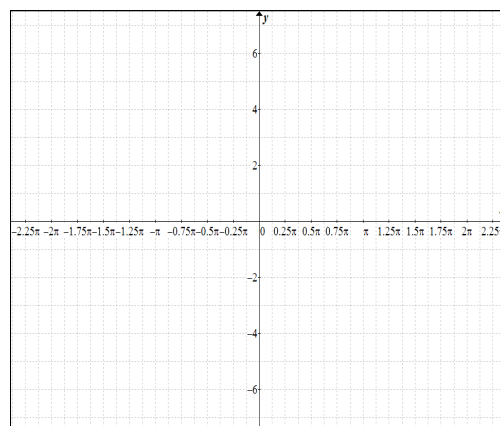
Example 3: Optimization Problem:

A rigid beam is negotiated around the corner of two hallways, one has a width of 3 m, the other 2 m. Find the maximum length of the beam that can turn about the corner of the hallways, neglecting the width of the beam.



Example 4: Curve Sketching

Sketch the graph of $f(x) = -x + \sin x$, $-2\pi \leq x \leq 2\pi$



Homework:
Read P. 254 eg 6
P.257 #6-8,10-13
P. 260 #6,7