3.1 Derivatives of Sine and Cosine Worksheet

This document was composed and formatted by Annie Bernatchez.

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1) Find the derivative with respect to x for each function.

a) $y = 4\sin x$

b) $f(x) = -3\cos x$

c) $y = \cos x - \sin x$

d) $y = x^2 - 3\sin x$

e) $y = \cos x + 7\pi \sin x - 3x$

f) $f(x) = \frac{\pi}{4}\cos x - \frac{\pi}{3}\sin x$

2) Find the equation of the line that is tangent to the function $y = \cos x$ and passes through the point $\left(\frac{\pi}{3}, \frac{1}{2}\right)$.

3) Find the equation of the line that is tangent to the function $y = -4\sin x$ at $x = \frac{\pi}{4}$.

4) Determine an equation for the tangent to the function $f(x) = \tan x$ at $x = \frac{\pi}{4}$.

5) Find an equation of a line that is tangent to $y = 2\sin x$ and whose slope is a max value.

Answer Key

1) a) $\frac{dy}{dx} = 4\cos x$ b) $f'(x) = 3\sin x$ c) $\frac{dy}{dx} = -\sin x - \cos x$ d) $\frac{dy}{dx} = 2x - 3\cos x$ e) $\frac{dy}{dx} = -\sin x + 7\pi\cos x - 3$ f) $\frac{dy}{dx} = -\frac{\pi}{4}\sin x - \frac{\pi}{3}\cos x$

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2) $y = -\frac{\sqrt{3}}{2}x + \frac{\pi\sqrt{3}+3}{6}$

3) $y = -2\sqrt{2}x + \frac{\sqrt{2}\pi}{2} - 2\sqrt{2}$

4) $y = 2x + 1 - \frac{\pi}{2}$

5) $y = 2x$; note: there are an infinite number of solutions. The slope is at a max value at any $x = 2k\pi$ where $k \in \mathbb{Z}$. Depending on which x value you choose, you will get a different y-intercept.

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