April 25

Solve for x on the interval $[0, 2\pi]$

$\cos(2x) - 1 = 0$

$\quad\quad\quad\;\; +1 \quad +1$

$\cos(2x) = 1$

$\cos^{-1}(\cos(2x)) = \cos^{-1}(1)$

$\frac{2x}{2} = \frac{0}{2}, \frac{2\pi}{2}, \frac{4\pi}{2}$

$x = 0, \pi, 2\pi$

$\frac{4\sin^2(x)}{4} = \frac{3}{4}$

$\sqrt{(\sin x)^2} = \sqrt{\frac{3}{4}}$

$\sin x = \pm\sqrt{\frac{3}{4}} = \frac{\pm\sqrt{3}}{2}$

$\sin^{-1}(\sin x) = \sin^{-1}\left(\pm\frac{\sqrt{3}}{2}\right)$

$x = \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{3}$

test corrections

→ sets 8-11

Due May 16th

April 25

Students will verbally explain how to find the derivative of inverse trig functions

(using the words: implicit, pythagoren identity, etc...)

$y = \arcsin(x)$

$(y = \sin^{-1}(x))$

find $\frac{dy}{dx}$

$y = \arcsin(x)$

$\sin(y) = \sin(\arcsin x)$

$\sin(y) = x$

$\frac{\cos(y)\,dy}{dx} = \frac{1 \cdot dx}{dx}$

$\frac{\cos(y)\frac{dy}{dx}}{\cos(y)} = \frac{1}{\cos(y)}$

$\frac{dy}{dx} = \frac{1}{\cos(y)}$

↑in terms of y

(would like to be in terms of x)

$\cos^2 y + \sin^2 y = 1$

$(\cos y)^2 + (\sin y)^2 = 1$

$(\cos y)^2 + x^2 = 1$

$\quad\quad\quad\; -x^2 \quad -x^2$

$(\cos y)^2 = 1 - x^2$

$\cos y = \sqrt{1-x^2}$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\arcsin x) = \frac{d}{dx}(\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\arccos x) = \frac{d}{dx}(\cos^{-1} x) = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\arctan x) = \frac{1}{1+x^2}$$

$$\frac{d}{dx}(\text{arccot}\, x) = \frac{-1}{1+x^2}$$

$$\frac{d}{dx}(\text{arcsec}\, x) = \frac{1}{|x|\sqrt{x^2-1}}$$

$$\frac{d}{dx}(\text{arccsc}\, x) = \frac{-1}{|x|\sqrt{x^2-1}}$$

$y = \cos^{-1}(4x)$

find y'

$$y' = \frac{-1}{\sqrt{1-(4x)^2}}(4) = \frac{-4}{\sqrt{1-16x^2}}$$

$f(x) = \operatorname{arcsec}(x^3 - 6x)$

find $f'(x)$

$$f'(x) = \frac{1}{|x^3-6x|\sqrt{(x^3-6x)^2-1}}(3x^2-6) = \frac{3x^2-6}{|x^3-6x|\sqrt{(x^3-6x)^2-1}}$$

$g(x) = 5x^2 \tan^{-1}(3x^4)$

find $\frac{d}{dx}(g(x))$

$$g'(x) = 10x\tan^{-1}(3x^4) + \frac{1}{1+(3x^4)^2}(12x^3)(5x^2)$$

$$g'(x) = 10x\tan^{-1}(3x^4) + \frac{60x^5}{1+9x^8}$$