Math 130 - Quiz 7 IC

October 16, 2019

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. You must work individually on this quiz.

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1. (2.5 points) Use an appropriate formula to compute the exact value of $\cos(105°)$.

$$\cos(105°) = \cos(60° + 45°)$$

$$= \cos 60° \cos 45° - \sin 60° \sin 45°$$

$$= \frac{1}{2}\left(\frac{\sqrt{2}}{2}\right) - \frac{\sqrt{3}}{2}\left(\frac{\sqrt{2}}{2}\right)$$

$$= \frac{\sqrt{2}}{4} - \frac{\sqrt{6}}{4} = \boxed{\frac{\sqrt{2} - \sqrt{6}}{4}}$$

2. (2.5 points) Use a sum or difference formula to rewrite $\sin\left(\frac{3\pi}{2} - \theta\right)$ as a trigonometric function of only θ.

$$\sin\left(\frac{3\pi}{2} - \theta\right)$$

$$= \sin\frac{3\pi}{2}\cos\theta - \cos\frac{3\pi}{2}\sin\theta$$

$$= (-1)\cos\theta - (0)\sin\theta$$

$$= \boxed{-\cos\theta}$$

Math 130 - Quiz 7 TH

October 16, 2019

Name key

Score _____

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1. (3 points) Find the exact value of $\cos(165°)$.

$$\cos(165°) = \cos(120° + 45°) = \cos 120° \cos 45° - \sin 120° \sin 45°$$

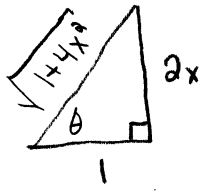
$$= \left(-\frac{1}{2}\right)\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{2}\frac{\sqrt{2}}{2}$$

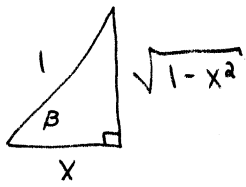
$$= \boxed{\frac{-\sqrt{2} - \sqrt{6}}{4}}$$

2. (5 points) Write as a algebraic expression: $\sin(\arctan 2x - \arccos x)$

$\theta = \arctan 2x$ $\qquad$ $\beta = \arccos x$

$\tan\theta = \frac{2x}{1}$ $\qquad$ $\cos\beta = \frac{x}{1}$





$$= \sin(\underbrace{\tan^{-1} 2x}_{\theta})\cos(\underbrace{\cos^{-1} x}_{\beta}) - \cos(\underbrace{\tan^{-1} 2x}_{\theta})\sin(\underbrace{\cos^{-1} x}_{\beta})$$

$$= \left(\frac{2x}{\sqrt{1+4x^2}}\right)(x) - \left(\frac{1}{\sqrt{1+4x^2}}\right)\left(\frac{\sqrt{1-x^2}}{1}\right)$$

$$= \boxed{\frac{2x^2 - \sqrt{1-x^2}}{\sqrt{1+4x^2}}}$$

3. (4 points) Find all solutions in the interval $[0, 2\pi)$: $\cos(x+\pi) - \cos x - 1 = 0$

$$\cos x \cos\pi - \sin x \sin\pi - \cos x - 1 = 0$$

$$-\cos x - 0 - \cos x - 1 = 0$$

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

$$-2\cos x = 1$$

$$\cos x = -\frac{1}{2}$$

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

Turn over.

4. (3 points) Find all solutions: $\cos 2x + \cos x = 0$

$2\cos^2 x - 1 + \cos x = 0$

$2\cos^2 x + \cos x - 1 = 0$

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

$\cos x = \frac{1}{2}$ or $\cos x = -1$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$ $\quad x = \pi$

All solutions...

$x = \frac{\pi}{3}, \frac{5\pi}{3}, \pi + 2k\pi$, where k is any integer