

# Math 112: Quiz 7.2:

1. Use an addition or subtraction formula to find the exact value of the expression. (show your steps):

+1

$$\begin{aligned} \sin \frac{7\pi}{12} &= \sin \left( \frac{3\pi}{12} + \frac{4\pi}{12} \right) = \sin \left( \frac{\pi}{4} + \frac{\pi}{3} \right) \\ &= \sin \frac{\pi}{4} \cos \frac{\pi}{3} + \cos \frac{\pi}{4} \sin \frac{\pi}{3} \\ &= \frac{\sqrt{2}}{2} \cdot \frac{1}{2} + \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{2} + \sqrt{6}}{4} \end{aligned}$$

2. Verify the following identity (show and justify your steps):

+2

$$\frac{\sin(x-y)}{\cos x \cos y} = \tan x - \tan y$$

$$\frac{\sin x \cos y - \cos x \sin y}{\cos x \cos y} \leftarrow \text{sum formula}$$

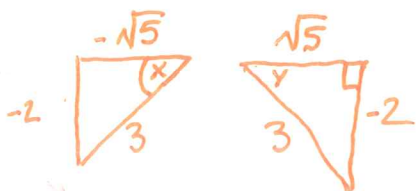
$$\frac{\sin x \cos y}{\cos x \cos y} - \frac{\cos x \sin y}{\cos x \cos y}$$

$$\frac{\sin x}{\cos x} - \frac{\sin y}{\cos y} = \tan x - \tan y \leftarrow \text{reciprocal ID}$$

3. Find  $\sin(x-y)$  exactly without using a calculator, using the facts that:

+2

$$\sin x = -\frac{2}{3}, \quad \cos y = \frac{\sqrt{5}}{3}, \quad x \text{ is a quadrant III angle, and } y \text{ is a quadrant IV angle}$$



$$\begin{aligned} \sin x \cos y - \cos x \sin y \\ &= -\frac{2}{3} \cdot \frac{\sqrt{5}}{3} - \left( -\frac{\sqrt{5}}{3} \right) \cdot \left( -\frac{2}{3} \right) \\ &= -\frac{2\sqrt{5}}{9} - \frac{2\sqrt{5}}{9} = -\frac{4\sqrt{5}}{9} \end{aligned}$$