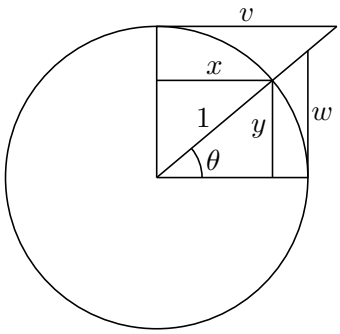
Name: _____ Mark: _____

Mini-math Div 3/4: Monday, December 14, 2020 (12 minutes)

1. (2 points) Consider the following diagram of a unit circle (lines which look perpendicular, are perpendicular):



Write x and y as trigonometric functions of θ.

Solution:

$$x = \cos\theta, \quad y = \sin\theta$$

Also: $v = \cot\theta, w = \tan\theta$. The hypotenuse of the right-angle triangle with height w, base 1 is $\sec\theta$ and the hypotenuse of the triangle with width v, height 1 is $\csc\theta$.

2. (2 points) Express $\tan\theta$, $\sec\theta$, $\cot\theta$, and $\csc\theta$ in terms of $\sin\theta$ and $\cos\theta$.

Solution:

$$\tan\theta = \frac{\sin\theta}{\cos\theta}, \qquad \cot\theta = \frac{\cos\theta}{\sin\theta},$$
$$\sec\theta = \frac{1}{\cos\theta}, \qquad \csc\theta = \frac{1}{\sin\theta}.$$

3. (2 points) Express $\sin^2\theta$ in terms of $\cos^2\theta$, $\tan^2\theta$ in terms of $\sec^2\theta$, and $\cot^2\theta$ in terms of $\csc^2\theta$.

Solution:

$$\sin^2\theta = 1 - \cos^2\theta$$
$$\tan^2\theta = \sec^2\theta - 1$$
$$\cot^2\theta = \csc^2\theta - 1$$

4. (2 points) Express $\sin(x+y)$ and $\cos(x+y)$ in terms of $\sin x$, $\sin y$, $\cos x$, and $\cos y$.

Solution:

$$\sin(x+y) = \sin x \cos y + \sin y \cos x$$
$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$

5. (2 points) How do you convert an angle between degrees and radians?

Solution: From degrees to radians: multiply by π, divide by 180°.
From radians to degrees: multiply by 180°, divide by π.