Mth 114 – Trigonometry – **Practice Exam 3**

NOTE: This exam should not be taken as a complete list of possible problems. It is merely intended to be an example of the length and difficulty level of the regular exam. To best utilize it as a *practice* exam, give yourself 55 minutes with no distractions. Try to emulate the classroom environment as much as possible. **Calculators are NOT ALLOWED on this exam.**

Half-Angle Identities:

$$\cos\frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}}$$

$$\sin\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}}$$

$$\tan\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{1+\cos A}}$$

$$\tan\frac{A}{2} = \frac{\sin A}{1+\cos A} = \frac{1-\cos A}{\sin A}$$

Product-to-Sum Identities:

$$\cos A\cos B = \tfrac{1}{2}\left[\cos(A+B)+\cos(A-B)\right]$$

$$\sin A\sin B = \tfrac{1}{2}\left[\cos(A-B)-\cos(A+B)\right]$$

$$\sin A\cos B = \tfrac{1}{2}\left[\sin(A+B)+\sin(A-B)\right]$$

$$\cos A\sin B = \tfrac{1}{2}\left[\sin(A+B)-\sin(A-B)\right]$$

Sum-to-Product Identities:

$$\sin A+\sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$$

$$\sin A-\sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$$

$$\cos A+\cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$$

$$\cos A-\cos B = -2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$$

1. Find $\sin s$ given $\cos s = \frac{3}{5}$ and s is in quadrant IV.

2. Find $\cos(s+t)$ given that $\sin s = \frac{2}{3}$ and $\sin t = -\frac{1}{3}$, s in quadrant II and t in quadrant IV.

3. Verify the following identities.

a. $\dfrac{\sin^2\theta}{\cos\theta} = \sec\theta - \cos\theta$

b. $\dfrac{1}{1-\sin\alpha} + \dfrac{1}{1+\sin\alpha} = 2\sec^2\alpha$

c. $\dfrac{\sin(x-y)}{\sin y} + \dfrac{\cos(x-y)}{\cos y} = \dfrac{\sin x}{\sin y \cos y}$

d. $\dfrac{2\cos 2\theta}{\sin 2\theta} = \cot\theta - \tan\theta$

4. Use identities to find each exact value.

a. $\sin 75°$

b. $\tan\dfrac{\pi}{12}$

c. $\sin 22.5°$

5. Find $\cos 2\theta$ given $\cos\theta = -\frac{12}{13}$.

6. Write the expression $\sin 5x \cos 3x$ as a sum or difference of trigonometric functions.

7. Find $\cos\frac{\theta}{2}$, given $\sin\theta = -\frac{1}{5}$, with $180° < \theta < 270°$.