Practice Exam 2

$$\sin(u+v) = \sin u \cos v + \cos u \sin v$$
$$\cos(u+v) = \cos u \cos v - \sin u \sin v$$

1. Is the following system consistent or inconsistent? Solve the system if it is consistent.

$$\begin{aligned} x + 9y &= 22 \\ 7x - 7y &= 14 \\ 2y - 6z &= 16 \end{aligned}$$

2. The double-angle identity for $\sin 2x$ is $\sin 2x =$ _____.

3. The power-reducing identity for $\sin^2 x$ is $\sin^2 x =$ _____ .

4. Find the exact value of $\sin\theta$, $\csc\theta$ and $\tan\theta$ if θ lies in quadrant IV and satisfies $\cos\theta = \frac{20}{29}$.

5. Find the exact value of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$ if $\cot\theta = -3$, $\frac{3\pi}{2} < \theta < 2\pi$.

6. Find the exact value of $\sin 15^\circ$ and $\cos\left(-\frac{\pi}{8}\right)$ using the half-angle formula.

7. Find the exact value of $\sin(45^\circ + 180^\circ)$ and $\cos\left(\frac{\pi}{3} + \frac{\pi}{4}\right)$.

8. If $\tan\alpha = \frac{1}{4}$ and $0 < \alpha < \frac{\pi}{2}$, find $\cos\alpha$.

9. Simplify the expression $\dfrac{\sin^2 x - \cos^2 x}{\sin x - \cos x}$.