

1. Express each of the following as a function of its co-related acute angle, then evaluate using exact values.

a) $\sin \frac{2\pi}{3}$

b) $\tan \frac{\pi}{6}$

c) $\sec \frac{5\pi}{4}$

[6]

2. Express as a single trigonometric function. Simplify only. [4,2]

a) $\cos\left(\frac{3\pi}{2} - x\right) + \sin(\pi + x) - \sin(x - 2\pi) + \cos\left(\frac{\pi}{2} + x\right)$

b) $\cos \frac{\pi}{6} \cos \frac{\pi}{4} + \sin \frac{\pi}{6} \sin \frac{\pi}{4}$

3. Simplify then evaluate using exact values. Rationalize the denominator [4,4]

a) $\tan \frac{11\pi}{12}$

b) $\sin \frac{\pi}{30} \cos \frac{2\pi}{15} + \cos \frac{\pi}{30} \sin \frac{2\pi}{15}$

4. Prove the following identities [3,3]

a)
$$\frac{\sin^2 x - \sin^2 y}{\cos^2 x - \sin^2 y} = \tan(x + y)\tan(x - y)$$

b)
$$\csc^2 y - \csc y \cot y = \frac{1}{1 + \cos y}$$