Formulas

Reciprocal Identities

$$\csc x = \frac{1}{\sin x}$$

$$\sec x = \frac{1}{\cos x}$$

$$\cot x = \frac{1}{\tan x}$$

Quotient Identities

$$\tan x = \frac{\sin x}{\cos x}$$

$$\cot x = \frac{\cos x}{\sin x}$$

Pythagorean Identities

$$\sin^2 x + \cos^2 x = 1$$

$$1 + \tan^2 x = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

Double Angle Formulas

$$\sin 2x = 2 \sin x \cos x$$

$$\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1 = 1 - 2\sin^2 x$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$

Addition and Subtraction Formulas

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

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

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

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

$$\tan(x + y) = \frac{\tan x + \tan y}{1 - \tan x \tan y}$$

$$\tan(x - y) = \frac{\tan x - \tan y}{1 + \tan x \tan y}$$

NO CALCULATOR!!!!

Self-Assessment:

Total mark: ___________/36

1. (4 marks) Express each of the following as a single trigonometric ratio first, then, evaluate.

   a) $1 - 2sin^2 \frac{7\pi}{12}$

   b) $\frac{2tan157.5°}{1-tan^2 157.5°}$

2. (2 marks) Write two equivalent expressions for $\sec \frac{9\pi}{10}$, one use related acute angle, another use co-function identities.

   $\sec \frac{9\pi}{10} =$ _______________ = ________________

3. (4 marks) Solve the equation. $2sin^2x - 7sinx + 3 = 0, \qquad 0 \le x \le 2\pi$.

4. (4 marks) Determine the exact value of $\cos\frac{5\pi}{12}$. Fully simplify, evaluate, and rationalize if necessary.

5. (4 marks) Expand and simplify first, then determine the exact value of $(sin\frac{7\pi}{12} + cos\frac{7\pi}{12})^2$.

6. (4 marks) Determine $sinx[2\cos(2x)] + sinx = 0,$ on the interval $0 \le x \le 2\pi$.

7. (4 marks) Determine the exact value of $sin\frac{\theta}{2}$, given that θ is in quadrant 4 and $tan\theta = -\frac{12}{5}$.

8. (4 marks) If $tanx = -1$ and $cosy = \frac{4}{5}$ with x and y in the interval $[\frac{3\pi}{2}, 2\pi]$, determine the exact value of $csc(x - y)$. Fully simplify and rationalize, if necessary.

9. (6 marks) Prove identities.

a) $sec2x = \frac{cscx}{cscx - 2sinx}$

b) $\frac{sin2x}{1 - cos2x} = cotx$