NAME:_____ **/ 60 =** **%**

MATH 127 TEST 2 SAMPLE

NOTE: The actual exam will only have 11 questions. The different parts of each question (parts A, B) are variations. Know how to do all the variations on this exam.

1A.) (6 points) Establish the identity: $\frac{\cos x - 1}{\sin x} + \frac{\sin x}{1 + \cos x} = 0$

1B.) (6 points) Establish the identity: $\frac{1 - \sin x}{\cos x} + \frac{\cos x}{1 - \sin x} = 2\sec x$

2A.) (6 pts) Establish the identity: $\dfrac{\cos\theta}{\sec\theta - \tan\theta} = 1 + \sin\theta$

2B.) (6 pts) Establish the identity: $\dfrac{\sec\theta - \cos\theta}{\sec\theta} = \sin^2\theta$

3A.) (4 pts) Establish the identity by using sum or difference formulas:

$$\sin(180^\circ - x) + \cos(x + 90^\circ) = 0$$

3B.) (4 pts) Establish the identity by using sum or difference formulas:

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

4A.) (10 points) Find the exact values given:
$\cot\theta = -\sqrt{2}$ and $\cos\theta > 0$.

$\sin\theta$:_____ $\csc\theta$:_____

$\cos\theta$:_____ $\sec\theta$:_____

$\tan\theta$:_____ $\sin 2\theta$:_____

$\cos 2\theta$:_____ $\tan 2\theta$:_____

$\sin\frac{\theta}{2}$:_____ $\tan\frac{\theta}{2}$:_____

4B.) (10 points) Find the exact values given:
$\tan\theta = \frac{5}{12}$ and $180^\circ \le \theta \le 270^\circ$.

$\sin\theta$:_____ $\cos\theta$:_____

$\cos\theta$:_____ $\sec\theta$:_____

$\cot\theta$:_____ $\sin 2\theta$:_____

$\cos 2\theta$:_____ $\tan 2\theta$:_____

$\cos\frac{\theta}{2}$:_____ $\tan\frac{\theta}{2}$:_____

5A.) (5 pts) Establish the identity by using double angle formulas:

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

5B.) (5 pts) Establish the identity by using double angle formulas:

$$\sin x - \cos(2x) = (2\sin x - 1)(\sin x + 1)$$

6A.) (4 pts) Find the exact value of $\cos\left(\frac{5\pi}{24}\right)\sin\left(\frac{\pi}{24}\right)$ using a product-to-sum formula.

6A._____

6B.) (4 pts) Simplify: $\sin(2\theta)\sin(8\theta)$ using a product-to-sum formula. Write with positive angles. 6B._____

7A.) (3 pts) Find the exact value of $\cos 15^\circ - \cos 75^\circ$ using a sum-to-product formula. 7A._____

7B.) (3 pts) Simplify: $\sin 2x - \sin 7x$ using a sum-to-product formula. Write with positive angles. 7B._____

8A.) (5 pts) Solve for x: $\sqrt{3}\sec^2 x - 2\sec x = 0$ on $[0,\ 360^\circ)$ 8A._____

8B.) (5 pts) Solve for θ: $\tan\theta\sin\theta + \sin\theta = 0$ on $[0,\ 2\pi)$ 8B._____

9A.) (5 pts) Solve for x: $2\cos^2 x - \sin x - 1 = 0$ on $[0,\ 2\pi)$ 9A._____

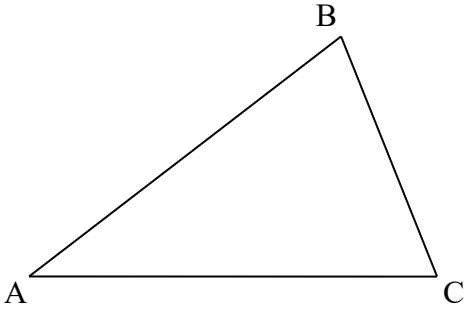
9B.) (5 pts) Solve for θ: $\cos\theta \sin 2\theta = \sin\theta$ on $[0,\ 360^\circ)$

9B._____

10A.) (6 pts) Given: a = 30, c = 40, and $m\angle A = 37^\circ$.

How many solutions does this triangle have?

Find the following (if possible). Round to two decimal places.



# of solutions:_____

$m\angle B_1$:_____

$m\angle C_1$:_____

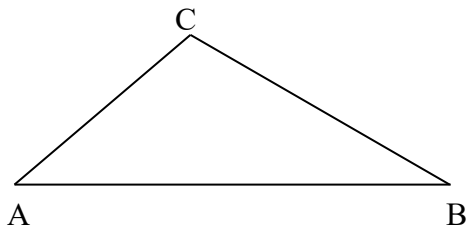
b_1:_____

$m\angle B_2$:_____

$m\angle C_2$:_____

b_2:_____

10B.) (6 pts) Given: a = 81, b = 62, and $m\angle A = 43^\circ$.
How many solutions does this triangle have?
Find the following (if possible). Round to two decimal places.



# of solutions:_____

$m\angle B_1$:_____

$m\angle C_1$:_____

c_1:_____

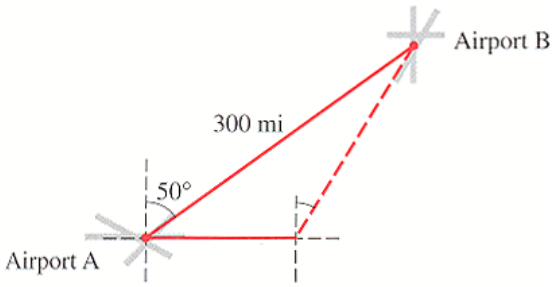
$m\angle B_2$:_____

$m\angle C_2$:_____

c_2:_____

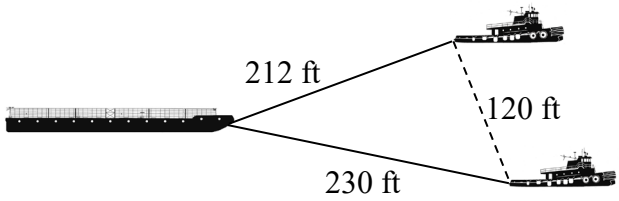
11A.) (6 pts) Airport B is 300 miles from airport A at a bearing of $N50^\circ E$ (see figure) A pilot wishing to fly from A to B mistakenly flies 100 miles due east, when he notices the error. How far is the pilot from his destination at the time he notices the error? Round to two decimal places.

11A._____



11B.) (6 pts) Two tugboats are 120 ft. apart pull a barge, as shown below. If the length of one cable is 212 ft and the length of the other is 230 ft, find the angle formed by the two cables. Round to two decimal places.

11B._____



FORMULA SHEET

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

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

$$\cos(x+y) = \cos x \cos y - \sin x \sin y \qquad \sin\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{2}}$$

$$\cos(x-y) = \cos x \cos y + \sin x \sin y \qquad \cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}}$$

$$\sin(2\theta) = 2\sin\theta\cos\theta \qquad \tan\frac{\theta}{2} = \frac{\sin\theta}{1+\cos\theta} \qquad \tan\frac{\theta}{2} = \frac{1-\cos\theta}{\sin\theta}$$

$$\cos(2\theta) = \cos^2\theta - \sin^2\theta \qquad \cos(2\theta) = 2\cos^2\theta - 1 \qquad \cos(2\theta) = 1 - 2\sin^2\theta$$

$$\tan(2\theta) = \frac{2\tan\theta}{1-\tan^2\theta} \qquad \cos^2\theta = \frac{1+\cos(2\theta)}{2} \qquad \sin^2\theta = \frac{1-\cos(2\theta)}{2}$$

$$\sin x \sin y = \frac{1}{2}\left[\cos(x-y) - \cos(x+y)\right] \qquad \sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\cos x \cos y = \frac{1}{2}\left[\cos(x-y) + \cos(x+y)\right] \qquad \sin x - \sin y = 2\sin\left(\frac{x-y}{2}\right)\cos\left(\frac{x+y}{2}\right)$$

$$\sin x \cos y = \frac{1}{2}\left[\sin(x-y) + \sin(x+y)\right] \qquad \cos x + \cos y = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$

$$\cos x \sin y = \frac{1}{2}\left[\sin(x+y) - \sin(x-y)\right] \qquad \cos x - \cos y = -2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

SOHCAHTOA

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$