Solutions to practice exam 2 for Math 1060-90 Online Trigonometry

Formulas and identities on the front of exam:

A few formulas:

$$c^2 = a^2 + b^2 - 2ab \cos C \qquad\qquad Area = \frac{1}{2}ab \sin C$$

$$\sin(u+v) = \sin u \cos v + \cos u \sin v \qquad \sin 2u = 2 \sin u \cos u$$

$$\cos(u+v) = \cos u \cos v - \sin u \sin v \qquad \cos 2u = 2\cos^2 u - 1 = 1 - 2\sin^2 u$$

$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v} \qquad\qquad \tan 2u = \frac{2\tan u}{1 - \tan^2 u}$$

$$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}} \qquad \cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}} \qquad \tan\frac{u}{2} = \frac{1-\cos u}{\sin u}$$

Formulas and identities you are expected to know:

Reciprocal identities:

Pythagorean Identities

Law of sines

1. a. $\sin 5\pi/8$
Use half-angle formula   b. $\tan 5\pi/12$
                                                                             use sum/difference formula

2. a. $\cos^{-1}(-\sqrt{3}/2)$ b. $\tan^{-1}(-1/\sqrt{3})$

3.   State all values on the interval $[0,2\pi]$ for which these are true.

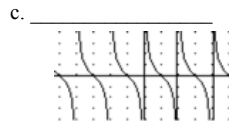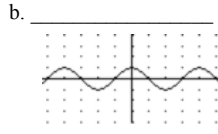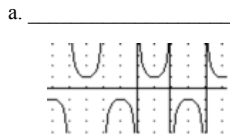a. $\sin x = 1/2$ b. $\sec x = -\sqrt{2}$

3. Determine all solutions for this equation on the interval $[0,2\pi)$
   $2\sin^2 x - \sin x - 1 = 0$ Hint: factor it first.

5. If $\cos \alpha = -3/5$ and $\tan \alpha < 0$ find $\cot \alpha$ and $\sin(2\alpha)$

Graphing trig functions.
For all graphs on this page x is on the interval and y is on the interval [-4,4]

6. These basic trig function graphs have **no** transformations. Write the equation of each.

a. _____   b. _____   c. _____

7. Circle all the expressions which have a value of 1:

   $(\sin x)(\tan x)$ $\sec^2 x - \tan^2 x$ $\dfrac{\cos x}{\sec x}$

   $\sin^2 x + \cos^2 x$ $\overline{\sqrt{(\sin x)(\tan x)(\sec x)}}$ $(\tan x)(\cot x)$

8. Expand and simplify: $(\sin x + \cos x)^2$

9. Verify this identity: $\dfrac{\sec^2 x - 1}{\sec^2 x} = \sin^2 x$

10. Add and simplify: $\dfrac{\sin \varnothing}{\cos \varnothing} + \dfrac{\cos \varnothing}{\sin \varnothing} =$

You may **use a calculator on these.** Round angles to 1 decimal place and sides to 2.. Draw a sketch, set up the math and solve for the variable. Because you have a calculator, you must be certain to show the math. Show the set-up and steps. Don't forget your units. (feet, degrees, etc.)

11. If a 30 foot wire from the roof of a building to the ground makes a 25° angle with the ground, how high is the building?

12. What is the measure of the largest angle of a triangle with sides 8, 9 and 10. What is the area of the triangle?

13. Two surveyors stand 30 meters apart on a straight path. They each measure the angle from the path to a straight line between them and a fixed tree. For one the angle is 72 degrees and for the other the angle is 53 degrees. How far away from the tree is each surveyor?

14. A ladder is to be placed so the bottom is 20 ft from the wall and the top hits the wall 33 feet up.
    How long must the ladder be and what angle will it make with the ground?