MTH 32 LECTURE NOTES (Ojakian)
Topic 12.5: Trig Review

OUTLINE

1. Radians versus Degrees

2. Definitions of Trig Functions: Triangle and Circle

3. Solving for angles

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1. <u>Radian measure</u>

    (a) Angles can be measured in degrees or radians. Just different units (like Kilograms versus Grams)

        i. Remember: 180 degress $= \pi$ radians

        ii. Degree to Radian: Mult by $\pi/180$

        iii. Radian to Degree: Mult by $180/\pi$

    (b)

    PROBLEM 1.

        i. Convert $90°$ to radians.

        ii. Convert $\pi/3$ radians to degrees.

2. <u>Definitions of Trigonometric Functions</u>

    (a) sin, cos, tan, csc, sec, and cot

    (b)

    PROBLEM 2. *Consider the right triangle whose 2 legs have length 3 and 4. Find all 6 trig functions of the angle that includes the side of length 4.*

    PROBLEM 3. *Consider the right triangle with a hypotenuse of length 10 and one leg of length 5 Find all 6 trig functions of the angle that includes the side of length 5.*

3. <u>Special Angles</u>

    Evaluate trig functions for angles: $\pi/6, \pi/4, \pi/3$ (i.e 30, 45, 60).

    (a) For 45 degree angle, draw a square and cut it in half diagonally.

    (b) For 30 and 60, draw an equilateral triangle and but it in half.

4. Representing angles with any measure

   (a) Standard position:

       i. One side (the **initial side**) points in the positive x-direction.
       ii. The other side (the **terminal side**) rotates from the initial side.
       iii. Positive angle: counter-clockwise rotation.
       iv. Negative angle: clockwise rotation.

   (b)

       PROBLEM 4. *Draw the following angles in standard position:*

       $$45^o, \quad -\pi/4, \quad 3\pi/2, \quad 210^o$$

       PROBLEM 5. *Draw the following angles in standard position:*

       $$\pi, \quad 135^o, \quad 120^o$$

   (c)

       Definition 1. *Angles with the same terminal side are called **co-terminal**.*

       PROBLEM 6. *Find some angles co-terminal with the ones above.*

5. Evaluating trig function from a point on terminal side
   $\sin(\theta) = y/r$
   $\cos(\theta) = x/r$
   $\tan(\theta) = y/x$
   csc, sec, and cot are defined as the reciprocals.

   PROBLEM 7. *Evaluate* $\tan(\theta)$ *and* $\sin(\theta)$ *where* $(-3, -4)$ *is a point on the terminal side of* θ.

   PROBLEM 8. *Evaluate* $\tan(\theta)$ *and* $\cos(\theta)$ *where* $(-1, 4)$ *is a point on the terminal side of* θ.

   PROBLEM 9. *Evaluate* $\sin(90^o)$

   PROBLEM 10. *Evaluate the following:*

   (a) $\cos(-180^o)$
   (b) $\tan(-\pi/2)$

   PROBLEM 11. *Evaluate the following (use a special triangle if needed):*
   $\tan(225^o)$ *and* $\sin(225^o)$

   PROBLEM 12. *Evaluate the following (use a special triangle if needed):*
   $\cos(-210^o)$ *and* $\sec(-210^o)$

6. <u>Evaluating trig function using a reference angle</u>

An alternative approach to evaluating trig functions of angles whose terminal side is not on the x or y axis.

(a) Draw the angle in standard position.

(b) Find the Reference Angle (the angle between the terminal side and the x-axis).

(c) Evaluate the trig function at the Reference Angle.

(d) Leave the answer as is, or modify by making negative, based on:
The quadrant of the terminal side and the trig function being evaluated.

(e)

PROBLEM 13. *Evaluate the following:* $\cos(3\pi/4)$, $\sin(3\pi/4)$, *and* $\tan(3\pi/4)$

PROBLEM 14. *Evaluate the following:* $\sin(7\pi/6)$ *and* $\csc(7\pi/6)$

7. <u>Solving for the angle</u>

To find SOME angle that works:

(a) Find a reference angle which gives the positive value

(b) Pick an angle that has that reference angle, and the correct sign.

(c) Problems

PROBLEM 15.

  i. *Suppose* $\tan\theta = -1$. *Find some solution* θ.

  ii. *Suppose* $\cos\theta = -1/2$. *Find some solution* θ.

PROBLEM 16.

  i. *Suppose* $\tan\theta = -\sqrt{3}$. *Find some solution* θ.

  ii. *Suppose* $\sin\theta = -1/2$. *Find some solution* θ.