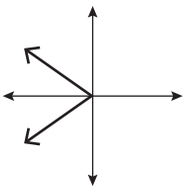
Practice Solutions – III

1. Consider the equation $\cos\theta = -\frac{2}{3}$ for $0° \leq \theta < 360°$.

   a. Sketch a diagram showing the two possible terminal arms of θ.



   Because the cosine ratio is negative, the angle must terminate in Quadrant II or III.

   b. Determine all possible values of θ, to the nearest tenth of a degree.

   Step 1: Determine the reference angle using the positive ratio.

$$\cos\theta_R = \frac{2}{3}$$
$$\theta_R = 48.189...°$$

   Step 2: Determine the angles in standard position that have a reference angle of 48.189…° in Quadrants II and III.

$$\theta = 180° - \theta_R$$
$$= 180° - 48.189...°$$
$$= 131.810...°$$
$$\doteq 131.8°$$

$$\theta = 180° + \theta_R$$
$$= 180° + 48.189...°$$
$$= 228.189...°$$
$$\doteq 228.2°$$

2. Solve the equation $\tan\theta = -1$ for $0° \leq \theta < 360°$.

   The tangent ratio is negative in Quadrants II and IV.

$$\tan\theta_R = 1$$
$$\theta_R = 45°$$

$$\theta = 180° - \theta_R$$
$$= 180° - 45°$$
$$= 135°$$

$$\theta = 360° - \theta_R$$
$$= 360° - 45°$$
$$= 315°$$

3. Solve the equation $\sin\theta = 0.996195$ for $0° \leq \theta < 360°$, to the nearest degree.

   The sine ratio is positive in Quadrants I and II.

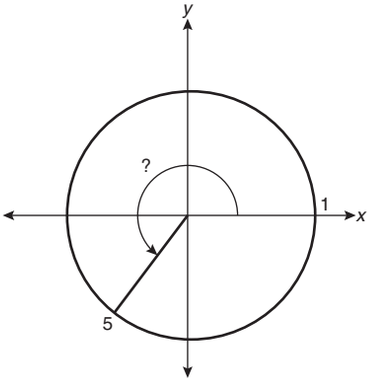
   $\sin\theta_R = 0.996195$
   $\theta_R = 85.000...°$

   $\theta = \theta_R$
   $= 85.000...°$
   $\doteq 85.0°$

   $\theta = 180° - \theta_R$
   $= 180° - 85.000...°$
   $= 95.000...°$
   $\doteq 95.0°$

4. James works for a catering business. He wonders what angle each guest's place setting makes with the centre of a round table. Using one table setting as $0°$, the fifth table setting has a trigonometric ratio of $\tan\theta = 0.36397$ in Quadrant III. Determine the number of people sitting at the table and the angle each guest's place setting makes with the centre of the table.

   Step 1: Draw a diagram.



   Step 2: Determine the reference angle of person number 5.

   $\tan\theta_R = 0.36397$
   $\theta_R = \tan^{-1}(0.36397)$
   $\theta_R \doteq 20°$

   Step 3: Determine the angle in standard position of person number 5.

   $\theta = 180° + \theta_R$
   $\theta \doteq 180° + 20°$
   $\theta \doteq 200°$

Step 4: Determine the number of guests at the table, using a proportion.

$$\frac{5}{x} = \frac{200^\circ}{360^\circ}$$
$$x = 9$$

Step 5: Determine the angle made by each table setting, using a proportion.

$$\frac{1}{9} = \frac{x}{360^\circ}$$
$$x = 40^\circ$$

There are 9 guests at the table, and each table setting makes an angle of 40° with the centre of the table.

Please complete *Lesson 4.2 Explore Your Understanding Assignment* located in *Workbook 4A* before proceeding to *Lesson 4.3*.