

## Math 26 Section 1

### Quiz 8 Solutions

1. (2 points) Let  $\sin A = -\frac{3}{5}$  with  $A \in Q3$ . Find  $\cos 2A$ .

$$\cos 2A = 1 - 2 \sin^2 A = 1 - 2 \left(\frac{-3}{5}\right)^2 = \frac{25}{25} - \frac{18}{25} = \frac{7}{25}$$

2. (4 points) Let  $\sin A = -\frac{3}{5}$  with  $A \in Q3$ . Find  $\sin \frac{A}{2}$ , using the identity  $\sin \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{2}}$ .

To use the identity, we must find  $\cos A$ . Note that this will be negative since  $A \in Q3$ .

$$\begin{aligned} \cos A &= -\sqrt{1 - \sin^2 A} = -\sqrt{1 - \left(\frac{-3}{5}\right)^2} = -\sqrt{\frac{25}{25} - \frac{9}{25}} = \\ &= -\sqrt{\frac{16}{25}} = -\frac{4}{5} \end{aligned}$$

Since  $A \in Q3$ ,  $\frac{A}{2} \in Q2$ , so  $\sin \frac{A}{2} \geq 0$ . Thus,

$$\sin \frac{A}{2} = \sqrt{\frac{1 - \cos A}{2}} = \sqrt{\frac{1 + \frac{4}{5}}{2}} = \sqrt{\frac{9}{10}} = \frac{3}{\sqrt{10}}$$

3. Solve the following equations for  $0 \leq \theta < 2\pi$ :

(a) (2 points)  $2 \sin \theta = 1$

This is equivalent to  $\sin \theta = \frac{1}{2}$ , which has a solution in the first quadrant and the second quadrant. Namely,  $\theta = \frac{\pi}{6}$  and  $\theta = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$ .

(b) (2 points)  $\cos^2 \theta - 1 = 0$

This is equivalent to  $\cos^2 \theta = 1$ , which is true iff  $\cos \theta = \pm 1$ . Thus  $\theta = 0, \pi$ .