

43.  $\tan \theta = -\frac{3}{4}$ . Then  $r = \sqrt{3^2 + 4^2} = 5$ , and so  $\sin \theta = -\frac{3}{5}$ ,  $\cos \theta = \frac{4}{5}$ ,  $\csc \theta = -\frac{5}{3}$ ,  $\sec \theta = \frac{5}{4}$ ,  
 $\cot \theta = -\frac{4}{3}$ .
45.  $\csc \theta = 2$ . Then  $\sin \theta = \frac{1}{2}$  and  $x = \sqrt{2^2 - 1^2} = \sqrt{3}$ . So  $\sin \theta = \frac{1}{2}$ ,  $\cos \theta = \frac{\sqrt{3}}{2}$ ,  $\tan \theta = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ ,  
 $\sec \theta = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$ ,  $\cot \theta = \sqrt{3}$ .
47.  $\cos \theta = -\frac{2}{7}$ . Then  $y = \sqrt{7^2 - 2^2} = \sqrt{45} = 3\sqrt{5}$ , and so  $\sin \theta = \frac{3\sqrt{5}}{7}$ ,  $\tan \theta = -\frac{3\sqrt{5}}{2}$ ,  
 $\csc \theta = \frac{7}{3\sqrt{5}} = \frac{7\sqrt{5}}{15}$ ,  $\sec \theta = -\frac{7}{2}$ ,  $\cot \theta = -\frac{2}{3\sqrt{5}} = -\frac{2\sqrt{5}}{15}$ .
49. (a)  $\sin 2\theta = \sin\left(2 \cdot \frac{\pi}{3}\right) = \sin \frac{2\pi}{3} = \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$ , while  $2 \sin \theta = 2 \sin \frac{\pi}{3} = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3}$ .
- (b)  $\sin \frac{1}{2}\theta = \sin\left(\frac{1}{2} \cdot \frac{\pi}{3}\right) = \sin \frac{\pi}{6} = \frac{1}{2}$ , while  $\frac{\sin \theta}{2} = \frac{1}{2} \cdot \sin \frac{\pi}{3} = \frac{1}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{4}$ .
- (c)  $\sin^2 \theta = \left(\sin \frac{\pi}{3}\right)^2 = \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}$ , while  $\sin(\theta^2) = \sin\left(\frac{\pi}{3}\right)^2 = \sin \frac{\pi^2}{9} \approx 0.88967$ .