

## Math 150 Exam 3 Review Answer Key

1. (a)  $40\pi$  rad/min  
(b)  $200\pi$  ft/min
2.  $\frac{-10 \sin 35^\circ}{\frac{\sin 35^\circ}{\sin 45^\circ} - 1} \approx 53.27$  ft
3.  $\frac{4 \sin 86^\circ}{\sin 13^\circ} \approx 17.74$  mi
4.  $a = \sqrt{124} = 2\sqrt{31}$ ;  $B = \sin^{-1}\left(\frac{5\sqrt{3}}{2\sqrt{31}}\right) \approx 51.05^\circ$ ;  $C \approx 68.95^\circ$
5. (a)  $\sin x = -\frac{\sqrt{7}}{4}$ ;  $\csc x = -\frac{4\sqrt{7}}{7}$   
 $\cos x = \frac{3}{4}$   
 $\tan x = -\frac{\sqrt{7}}{3}$ ;  $\cot x = -\frac{3\sqrt{7}}{7}$   
(b)  $\sin 2x = -\frac{3\sqrt{7}}{8}$ ;  $\csc 2x = -\frac{8\sqrt{7}}{21}$   
 $\cos 2x = \frac{1}{8}$ ;  $\sec 2x = 8$   
 $\tan 2x = -3\sqrt{7}$ ;  $\cot 2x = -\frac{\sqrt{7}}{21}$
6. See Full Solutions
7.  $-\frac{63}{65}$
8.  $\frac{\sqrt{6}-\sqrt{2}}{4}$
9.  $-\frac{\sqrt{6}}{2}$
10. (a)  $\frac{2\pi}{3}$   
(b)  $-\frac{\pi}{6}$   
(c)  $\frac{5}{4}$
11. (a)  $x = \frac{5\pi}{12} + k\pi, \frac{7\pi}{12} + k\pi$   
(b)  $\frac{5\pi}{12}, \frac{7\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}$
12. (a)  $\langle 10, -3 \rangle$   
(b)  $\sqrt{145}$   
(c) 11  
(d)  $\cos^{-1}\left(\frac{11}{\sqrt{34}\sqrt{53}}\right)$   
(e)  $\frac{11}{\sqrt{53}}$   
(f)  $\left\langle \frac{77}{53}, \frac{22}{53} \right\rangle$
13.  $\langle -180, 200\sqrt{3} \rangle$
14. 51

15. Solution set is bounded in Quadrant I. Vertices are  $(0, 0)$ ,  $(0, 1)$ ,  $(1, 0)$ ,  $(3, 4)$ , and  $(4, 3)$ .

16.  $2 \sin\left(x + \frac{4\pi}{3}\right)$

17.  $\sin \frac{x}{2} = \sqrt{\frac{1}{8}}$   
 $\cos \frac{x}{2} = -\sqrt{\frac{7}{8}}$   
 $\tan \frac{x}{2} = -\frac{\sqrt{7}}{7}$