

## Math 150 Exam 3 Review Answer Key

1. (a)  $\frac{2\pi}{3}$   
 (b)  $-\frac{\pi}{4}$   
 (c)  $\frac{\pi}{3}$   
 (d)  $\frac{9}{\sqrt{77}}$   
 (e)  $\frac{5}{3}$
2.  $\frac{2x}{1+x^2}$
3. (a)  $u = \frac{\pi}{3} + 2k\pi, \frac{5\pi}{3} + 2k\pi, \pi + 2k\pi$   
 (b)  $x = \frac{\pi}{6} + k\pi, \frac{5\pi}{6} + k\pi, \frac{\pi}{4} + k\pi$   
 (c)  $x = \frac{5\pi}{4} + 10k\pi, \frac{15\pi}{4} + 10k\pi$
4. (i)  $x = \frac{7\pi}{24} + \frac{k\pi}{2}, \frac{11\pi}{24} + \frac{k\pi}{2}$   
 (ii)  $\frac{7\pi}{24}, \frac{11\pi}{24}, \frac{19\pi}{24}, \frac{23\pi}{24}, \frac{31\pi}{24}, \frac{35\pi}{24}, \frac{43\pi}{24}, \frac{47\pi}{24}$
5. (a)  $\langle 10, -3 \rangle$   
 (b)  $\sqrt{145}$   
 (c) 11  
 (d)  $\approx 74.9816^\circ$   
 (e)  $\langle \frac{7}{\sqrt{53}}, \frac{2}{\sqrt{53}} \rangle$
6.  $\langle -\frac{3\sqrt{3}}{2}, -\frac{3}{2} \rangle$
7.  $\approx 111.8014^\circ$
8. (a)  $\langle -\frac{15}{2}, -\frac{15\sqrt{3}}{2} + 3 \rangle$   
 (b) Speed:  $\approx 12.4923$  mph; Bearing: S  $36.8964^\circ$  W. As a direction, this would be  $233.1036^\circ$
9.  $-\frac{10}{3}$
10.  $\frac{10}{\csc 35^\circ - \csc 40^\circ} \approx 53.27$  ft
11.  $\frac{4 \sin 86^\circ}{\sin 13^\circ} \approx 17.7383$  mi
12. (a)  $a = \sqrt{124} = 2\sqrt{31} \approx 11.1355, C \approx 68.9483^\circ, B \approx 51.0517^\circ$   
 (b) Case 1:  $C \approx 54.4367^\circ, B \approx 101.5633^\circ, b \approx 21.6782$   
 Case 2:  $C \approx 125.5633^\circ, B \approx 30.4367^\circ, b \approx 11.2094$
13. (a)  $\sin x = -\frac{\sqrt{7}}{4}, \cos x = \frac{3}{4}, \tan x = -\frac{\sqrt{7}}{3}, \csc x = -\frac{4}{\sqrt{7}}, \cot x = -\frac{3}{\sqrt{7}}$   
 (b)  $\sin 2x = -\frac{3\sqrt{7}}{8}, \cos 2x = \frac{1}{8}, \tan 2x = -3\sqrt{7}, \csc 2x = -\frac{8}{3\sqrt{7}}, \sec 2x = 8, \cot 2x = -\frac{1}{3\sqrt{7}}$
14. See Full Solutions
15.  $-\frac{63}{65}$
16.  $\frac{\sqrt{3}-1}{2\sqrt{2}} = \frac{\sqrt{6}-\sqrt{2}}{4}$

17.  $-\frac{\sqrt{6}}{2}$

18.  $-\frac{\sqrt{2-\sqrt{3}}}{2}$

19.  $\sin \frac{x}{2} = \sqrt{\frac{1}{8}} = \frac{1}{2\sqrt{2}}$ ,  $\cos \frac{x}{2} = -\sqrt{\frac{7}{8}} = -\frac{\sqrt{7}}{2\sqrt{2}} = -\frac{\sqrt{14}}{4}$ ,  $\tan \frac{x}{2} = -\frac{1}{\sqrt{7}}$

20. (a)  $40\pi$  rad/min

(b)  $200\pi$  ft/min

(c)  $\frac{25\pi}{36}$  ft<sup>2</sup>