MA 154 Exam 2 Spring 2004

This exam covered from question #33 of section 6.7, 7.2, 7.3, 7.4, up to question #14 of section 7.6

1. A builder wishes to construct a ramp 30 feet long that rises to a height of 6 feet above level ground. Approximate the angle that the ramp should make with the horizontal. Round to the nearest tenth of a degree.

   A. 13.8º

   B. 11.3º

   C. 18.5º

   D. 11.5º

   E. None of the above.

2. Find the exact value of the expression.

   $\tan^{-1}\left(\tan\left(\frac{4\pi}{3}\right)\right)$

   A. $\frac{4\pi}{3}$

   B. $-\frac{2\pi}{3}$

   C. $\frac{5\pi}{3}$

   D. $-\frac{\pi}{3}$

   E. None of the above.

3. Express the following as a trigonometric function of one angle.

   $\cos 41° \sin 5° + \cos 5° \sin 41°$

   A. $\sin 46°$

   B. $\cos 46°$

   C. $\sin 36°$

   D. $\cos 36°$

   E. None of the above.

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4. From a point that is 10.5 meters above level ground, the angle of elevation of the top of a nearby building is $35°20'$ and the angle of depression of the base of the same building is $9°30'$. Approximate, to the nearest tenth of a meter, the height of the nearby building.

A. 35.6 meters

B. 55.0 meters

C. 44.5 meters

D. 46.1 meters

E. None of the above.

5. Find all solutions of the equation. Let *n* be an arbitrary integer.

$$3\sec^2\alpha - 4 = 0$$

A. $\frac{\pi}{3} + 2\pi n, \frac{2\pi}{3} + 2\pi n$

B. $\frac{\pi}{3} + \pi n, \frac{2\pi}{3} + \pi n$

C. $\frac{\pi}{6} + 2\pi n, \frac{5\pi}{6} + 2\pi n$

D. $\frac{\pi}{6} + \pi n, \frac{5\pi}{6} + \pi n$

E. None of the above.

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6. Find the solutions of the equation that are in the interval $[0,2\pi)$.

$$2\sin^2\alpha + \sin\alpha - 1 = 0$$

A. $\frac{7\pi}{6}, \frac{11\pi}{6}, \pi$

B. $\frac{\pi}{3}, \frac{2\pi}{3}, \pi$

C. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

D. $\frac{4\pi}{3}, \frac{5\pi}{3}, \frac{3\pi}{2}$

E. None of the above.

7. A ship leaves port at 1:00 PM and sails in the direction N 35º W at a rate of 31 mi/h. A second ship leaves the same port at 2:00 PM and sails in the direction S 55º W at a rate of 25 mi/h. At 4:00 PM, what is the bearing from the first ship to the second? Round to the nearest whole degree.

A. S 17º E

B. S 11º E

C. S 13º E

D. S 7º E

E. None of the above.

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8. How many solutions of the equation are in the interval $[0,2\pi)$?

$$\cos\left(3x+\frac{\pi}{3}\right)=0$$

A. 2

B. 3

C. 6

D. 9

E. None of the above.

9. If α and β are **acute** angles such that $\cos\alpha=\frac{1}{3}$ and $\tan\beta=\frac{4}{7}$, find $\cos(\alpha-\beta)$.

A. $\frac{7-8\sqrt{2}}{3\sqrt{65}}$

B. $\frac{7+8\sqrt{2}}{3\sqrt{65}}$

C. $\frac{14\sqrt{2}+4}{3\sqrt{65}}$

D. $\frac{14\sqrt{2}-4}{3\sqrt{65}}$

E. None of the above.

10. $\cos^4 x-\sin^4 x$ is equivalent to which of the following?

A. 4

B. $\sin(2x)$

C. 1

D. $\cos(2x)$

E. None of the above.

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11. $\sin\left(\theta - \frac{\pi}{6}\right)$ is equivalent to which of the following?

A. $\frac{1}{2}\left(\sqrt{3}\sin\theta - \cos\theta\right)$

B. $\frac{1}{2}\left(\sqrt{3}\cos\theta + \sin\theta\right)$

C. $\frac{1}{2}\left(\sqrt{3}\sin\theta + \cos\theta\right)$

D. $\frac{1}{2}\left(\sqrt{3}\cos\theta - \sin\theta\right)$

E. None of the above.

12. If $\tan\theta = \frac{5}{4}$, for $180° < \theta < 270°$, find the exact value of $\tan(2\theta)$.

A. $-\frac{40}{41}$

B. $-\frac{40}{9}$

C. $\frac{40}{41}$

D. $\frac{40}{9}$

E. None of the above.

13. How many solutions of the equation are in the interval $[0,2\pi)$?

$\sin(2t) = 2\sin(t)$

A. 0

B. 1

C. 2

D. 3

E. None of the above.

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14. Find all solutions of the equation. Let *n* be an arbitrary integer.

$$\sin x = -\frac{\sqrt{3}}{2}$$

A. $\frac{4\pi}{3} + 2\pi n, \frac{5\pi}{3} + 2\pi n$

B. $\frac{\pi}{3} + 2\pi n, \frac{2\pi}{3} + 2\pi n$

C. $\frac{\pi}{6} + 2\pi n, \frac{5\pi}{6} + 2\pi n$

D. $\frac{7\pi}{6} + 2\pi n, \frac{11\pi}{6} + 2\pi n$

E. None of the above.

15. Find the exact value of the expression.

$$\cos\left(\arcsin\left(-\frac{\sqrt{3}}{2}\right)\right)$$

A. $\frac{1}{2}$

B. $-\frac{\pi}{3}$

C. $-\frac{1}{2}$

D. $\frac{\pi}{3}$

E. None of the above.

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	Answers	Letter
1	11.5º	D
2	$\frac{\pi}{3}$, (None of the above)	E
3	$\sin 46°$	A
4	55.0 meters	B
5	$\frac{\pi}{6}+\pi n, \frac{5\pi}{6}+\pi n$	D
6	$\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$	C
7	S 7º E	D
8	$\frac{\pi}{18}, \frac{7\pi}{18}, \frac{13\pi}{18}, \frac{19\pi}{18}, \frac{25\pi}{18}, \frac{31\pi}{18}$ (6 solutions)	C
9	$\frac{7+8\sqrt{2}}{3\sqrt{65}}$	B
10	$\cos(2x)$	D
11	$\frac{1}{2}\left(\sqrt{3}\sin\theta-\cos\theta\right)$	A
12	$-\frac{40}{9}$	B
13	0, π, (2 solutions)	C
14	$\frac{4\pi}{3}+2\pi n, \frac{5\pi}{3}+2\pi n$	A
15	$\frac{1}{2}$	A