MA 154 Exam 3 Spring 2002

This exam covers Sections 7.4, 7.6, 8.1, 8.2, 8.5, 8.6

1. Find $4a + 5b$ for $a = 3i + 2j$ and $b = 2i - 7j$.

A. $5i - 5j$ B. $2i - 43j$ C. $22i + 27j$ D. $2i + 43j$ E. None of these.

2. Given the following information about ΔABC, find $\alpha(\angle BAC)$. Round your answer to the nearest tenth of a degree.

   $a = 3$, $b = 5$, and $c = 7$

A. 21.8° B. 120.0° C. 38.2° D. 36.0° E. Cannot be determined from the information provided.

3. Write as an algebraic expression in x, for $x > 0$:

   $\sin\left(\cos^{-1} x\right)$

A. $\frac{1}{x}$ B. $\frac{\sqrt{1-x^2}}{x}$ C. $\sqrt{1-x^2}$ D. $-\frac{1}{x}$ E. $\frac{x}{\sqrt{1-x^2}}$

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4. Which of the following is equivalent to $\sin 2\theta$ for $\tan\theta = -\frac{a}{b}$, where $90° < \theta < 180°$ and $a > 0$ and $b > 0$?

A. $\frac{2ab}{a^2 + b^2}$ B. $-\frac{2a\sqrt{b^2 - a^2}}{b^2}$ C. $-\frac{2ab}{a^2 + b^2}$ D. $\frac{2a\sqrt{b^2 - a^2}}{b^2}$ E. None of these.

5. Which of the following is equivalent to $\cos\frac{\theta}{2}$ for $\csc\theta = -\frac{17}{8}$, where $180° < \theta < 270°$.

A. $\sqrt{\frac{1 + \frac{15}{17}}{2}}$ B. $-\sqrt{\frac{1 - \frac{15}{17}}{2}}$ C. $\sqrt{\frac{1 - \frac{15}{17}}{2}}$ D. $-\sqrt{\frac{1 + \frac{15}{17}}{2}}$ E. None of these.

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6. $(\tan 2\alpha)(1+\tan\alpha)$ is equivalent to which of the following?

A. $\dfrac{2+2\tan\alpha}{1+\tan\alpha}$ B. $2\tan\alpha - 2$ C. $2\tan\alpha + 2$ D. $\dfrac{2\tan\alpha}{1-\tan\alpha}$ E. $\dfrac{2+2\tan\alpha}{1-\tan\alpha}$

7. The vectors *a* and *b* represent two forces acting at the same point, and θ is the smallest positive angle between *a* and *b*. Approximate, to the nearest tenth of a pound, the magnitude of the resultant force.

a = 7.2 lbs., *b* = 3.5 lbs., $\theta = 50°$

A. 5.6 lb B. 9.8 lb C. 8.0 lb D. 6.9 lb E. 9.2 lb

8. Find the solutions of the equation, in the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ to four decimal places.

$\sin^2 x - 6\sin x + 2 = 0$

A. 0.3542 B. 0.3621, 5.9211 C. 0.3621 D. 0.3542, 5.9289 E. None of these.

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9. Two observers simultaneously measure the angle of elevation of a helicopter as it passes between them and above the line joining them. For one observer, the angle is 25° and for the other observer, the angle is 40°. If the observers are 120 feet apart, how high is the helicopter flying? Round your answer to the nearest foot.

A. 28 ft. B. 50 ft. C. 56 ft. D. 85 ft. E. 36 ft.

10. Find the angle, to the nearest tenth of a degree, between the vectors $< 3, 7 >$ and $< 2, 1 >$.

A. 87.4° B. 60.8° C. 139.8° D. 40.2° E. 81.7°

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11. Find the exact value of the expression if it is defined.

$$\tan\left[2\arcsin\left(-\frac{20}{29}\right)\right]$$

A. $-\frac{69}{50}$ B. $\frac{69}{50}$ C. $\frac{840}{41}$ D. Undefined E. None of these.

12. At 2:00 PM, a ship leaves port and travels N10°E at a rate of 20 miles per hour. At 2:30 PM, another ship leaves the same port and travels S65°W at 30 mph. How far apart are the two ships at 4:30 PM? Approximate your answer to the nearest mile.

A. 45 miles B. 98 miles C. 32 miles D. 67 miles E. 34 miles

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MA 154
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Exam 3 Answers:

Question	Answers	Letter
1	$22i - 27j$	E
2	$21.8°$	A
3	$\sqrt{1-x^2}$	C
4	$-\frac{2ab}{a^2+b^2}$	C
5	$-\sqrt{\frac{1-\frac{15}{17}}{2}}$	B
6	$\frac{2\tan\alpha}{1-\tan\alpha}$	D
7	9.8 lb	B
8	0.3621	C
9	36 ft.	E
10	$40.2°$	D
11	$-\frac{840}{41}$	E
12	98 miles	B