

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 $\triangle ABC$, find $\angle C$. Round your answer to the nearest tenth of a degree.

$$a = 3, b = 5, \text{ and } c = 7$$

- 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 $x > 0$:

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

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

4. Which of the following is equivalent to $\sin 2\theta$ for $\tan \theta = -\frac{a}{b}$, where $90^\circ < \theta < 180^\circ$ 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 $180^\circ < \theta < 270^\circ$.

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.

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

- A. $\frac{2 + 2\tan \theta}{1 + \tan \theta}$ B. $2\tan \theta - 2$ C. $2\tan \theta + 2$ D. $\frac{2\tan \theta}{1 - \tan \theta}$ E. $\frac{2 + 2\tan \theta}{1 - \tan \theta}$

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.

$$a = 7.2 \text{ lbs.}, b = 3.5 \text{ lbs.}, \theta = 50^\circ$$

- 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 $-\frac{\pi}{2}, \frac{\pi}{2}$ 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.

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 $\langle 3, 7 \rangle$ and $\langle 2, 1 \rangle$.
- A. 87.4° B. 60.8° C. 139.8° D. 40.2° E. 81.7°

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

$$\tan 2\arcsin -\frac{20}{29}$$

- 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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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	$\sqrt{1 - \frac{15}{17}}$ $-\sqrt{\frac{17}{2}}$	B
6	$\frac{2\tan}{1 - \tan}$	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