

MA 15400

Spring 2012

Exam 3

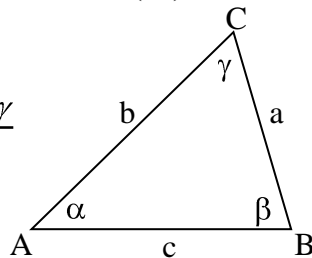
$$\sin(2u) = 2 \sin u \cos u$$

$$\cos(2u) = \cos^2 u - \sin^2 u$$

$$\tan(2u) = \frac{2 \tan u}{1 - \tan^2 u}$$

LAW OF SINES

$$\frac{\sin \alpha}{a} = \frac{\sin \beta}{b} = \frac{\sin \gamma}{c}$$



LAW OF COSINES

$$c^2 = a^2 + b^2 - 2ab \cos \gamma$$

ANGLE BETWEEN TWO VECTORS:

$$\cos \theta = \frac{(\vec{a}) \cdot (\vec{b})}{\|\vec{a}\| \|\vec{b}\|}$$

Covering Section 7.4 starting at #35 and Sections 7.6, 8.1, 8.2, 8.3, and 8.4

1. Given $a = \langle -2, 6 \rangle$ and $b = \langle 4, 5 \rangle$, find $2a - 3b$.

A. $\langle -8, 27 \rangle$

B. $\langle -16, -3 \rangle$

C. $\langle 8, 3 \rangle$

D. $\langle 16, -27 \rangle$

E. None of the above

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

$$\sqrt{2} \sin t + \sin(2t) = 0$$

A. $0, \pi, \frac{\pi}{4}, \frac{7\pi}{4}$

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

C. $0, \pi, \frac{3\pi}{4}, \frac{5\pi}{4}$

D. $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{4}, \frac{7\pi}{4}$

E. None of the above

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

$$a = 4.6lb, b = 7.8lb, \theta = 71^\circ$$

- A. 9.7 lb
 - B. 7.7 lb
 - C. 9.0 lb
 - D. 10.3 lb
 - E. None of the above.
4. Find the exact value of the expression.

$$\sin^{-1}\left(\sin \frac{5\pi}{3}\right)$$

- A. $-\frac{\pi}{3}$
- B. $\frac{2\pi}{3}$
- C. $\frac{\pi}{3}$
- D. $\frac{4\pi}{3}$
- E. None of the above

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5. Find the exact value of the expression.

$$\sin\left[2\arccos\left(\frac{-4}{7}\right)\right]$$

A. $\frac{-25}{49}$

B. $\frac{8\sqrt{33}}{49}$

C. $\frac{25}{49}$

D. $\frac{-8\sqrt{33}}{49}$

E. None of the above

6. Determine m such that the two vectors are orthogonal.

$$a = \langle 3m, 6 \rangle, b = \langle 5, -7 \rangle$$

A. $m = \frac{35}{18}$

B. $m = \frac{14}{5}$

C. $m = \frac{-35}{18}$

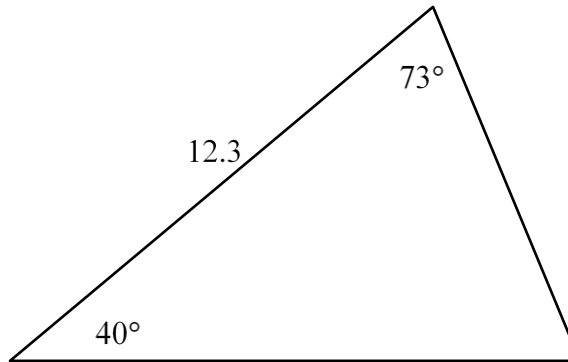
D. $m = \frac{-14}{5}$

E. None of the above

Covering Section 7.4 starting at #35 and Sections 7.6, 8.1, 8.2, 8.3, and 8.4

7. Approximate the perimeter of the given triangle to one decimal place.

- A. 35.4
- B. 28.7
- C. 33.7
- D. 30.4
- E. None of the above



8. An airplane, with airspeed of 250 miles per hour, is flying in the direction 65° and a 52 mile per hour wind is blowing directly from the west. What is the ground speed of the airplane rounded to the nearest mile per hour?
- A. 285 mph
 - B. 294 mph
 - C. 276 mph
 - D. 298 mph
 - E. None of the above

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9. The bearing from Point A to Point B is $N37^\circ W$ and the bearing from Point A to Point C is $N21^\circ E$. The distance from Point A to Point B is 175 miles and the distance from Point A to Point C is 222 miles. To the nearest mile, approximately how far is it from Point B to Point C?
- A. 197 miles
 - B. 348 miles
 - C. 217 miles
 - D. 309 miles
 - E. None of the above
10. From Point P, the angle of elevation of the top of a nearby building is 29° . From a point 350 feet closer to the building, and on the line connecting Point P and the base of the building, the angle of elevation to the top of the same building is 43° . Rounded to the nearest foot, what is the height of the building?
- A. 987 feet
 - B. 701 feet
 - C. 478 feet
 - D. 566 feet
 - E. None of the above

Covering Section 7.4 starting at #35 and Sections 7.6, 8.1, 8.2, 8.3, and 8.4

11. Find the angle between vectors $a = \langle 4, 2 \rangle$ and $b = \langle -5, 3 \rangle$ to the nearest tenth of a degree.
- A. 105.6°
 - B. 122.5°
 - C. 100.1°
 - D. 109.4°
 - E. None of the above
12. Which of the following is a unit vector in the same direction as $a = -3i + 4j$.
- A. $\frac{-3}{5}i + \frac{4}{5}j$
 - B. $-3i + 4j$
 - C. $\frac{3}{5}i - \frac{4}{5}j$
 - D. $3i - 4j$
 - E. None of the above
13. There are two distinct $\triangle ABC$ with $\alpha = 51^\circ$, $a = 11.2$ and $b = 14.3$. Find the smaller value of two angles γ to the nearest degree.
- A. $\gamma = 23^\circ$
 - B. $\gamma = 46^\circ$
 - C. $\gamma = 32^\circ$
 - D. $\gamma = 67^\circ$
 - E. None of the above

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14. Find the solutions of the equation that are in the interval $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$ to four decimal places.

$$\tan^2 x - 3 \tan x - 5 = 0$$

- A. 1.4467, -1.1365
- B. 4.1926, -1.1926
- C. 0.1876, -0.3817
- D. 1.3367, -0.8730
- E. None of the above

15. Write the expression as an algebraic expression in x for $x > 0$.

$$\sin\left(\arctan\left(\frac{x}{3}\right)\right)$$

- A. $\frac{x}{\sqrt{9+x^2}}$
- B. $\frac{3}{3+x}$
- C. $\frac{3}{\sqrt{9+x^2}}$
- D. $\frac{x}{3+x}$
- E. None of the above

Question	Exam 3 Answers
1.	B. $\langle -16, -3 \rangle$
2.	C. $0, \pi, \frac{3\pi}{4}, \frac{5\pi}{4}$
3.	D. 10.3 lb
4.	A. $\frac{-\pi}{3}$
5.	D. $\frac{-8\sqrt{33}}{49}$
6.	B. $m = \frac{14}{5}$
7.	C. 33.7
8.	D. 298 mph
9.	A. 197 miles
10.	C. 478 feet
11.	B. 122.5°
12.	A. $\frac{-3}{5}i + \frac{4}{5}j$
13.	C. $\gamma = 32^\circ$
14.	D. 1.3367, -0.8730
15.	A. $\frac{x}{\sqrt{9+x^2}}$