

This exam covers section 7.6 (starting with question #19), sections 8.1, 8.2, 8.3, 8.4 and 4.5.

1) For $a = -3i + 6j$ and $b = 4i + 9j$, find $2a + 3b$.

- A. $-18i - 15j$
- B. $18i + 29j$
- C. $6i - 15j$
- D. $6i + 29j$
- E. None of these.

2) Determine the value of m such that the two vectors are orthogonal.

$$3mi + 4j, \quad 6 - 13j$$

- A. $m = \pm \frac{4}{3}$
- B. $m = \frac{26}{9}$
- C. $m = \pm \frac{9}{26}$
- D. $m = \frac{39}{24}$
- E. None of these.

3) Find the exact value of the expression.

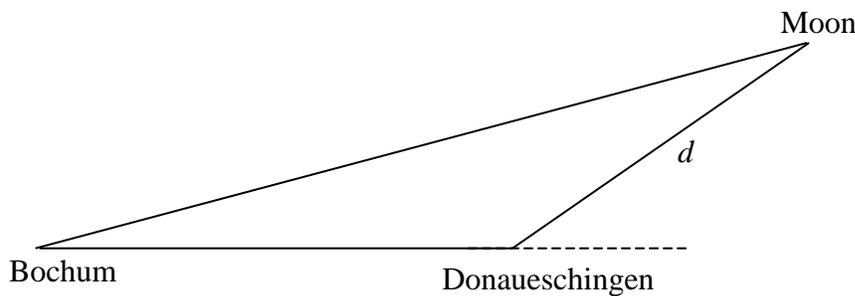
$$\sin \tan^{-1} \frac{1}{3}$$

- A. $\frac{3}{2\sqrt{2}}$
- B. $-\frac{1}{2\sqrt{2}}$
- C. $-\frac{1}{\sqrt{10}}$
- D. $\frac{3}{\sqrt{10}}$
- E. None of these.

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- 4) Given the following information about $\triangle ABC$, find $\angle C$.
 $\angle A = 35.0^\circ$, $b = 7.5$, and $a = 8.1$
- A. 32.1°
 - B. 38.3°
 - C. 106.7°
 - D. 112.9°
 - E. None of these.

- 5) On April 29, 1976 at 11:35 AM, the lunar angles of elevation during a partial solar eclipse at Bochum, Germany, and Donaueschingen, Germany, were measured as $\angle B = 52.7^\circ$ and $\angle A = 52.8^\circ$, respectively. If the two cities are 759.6 km apart, approximate the distance from Donaueschingen to the moon, d , to the nearest kilometer. Disregard the curvature of the Earth in this calculation.

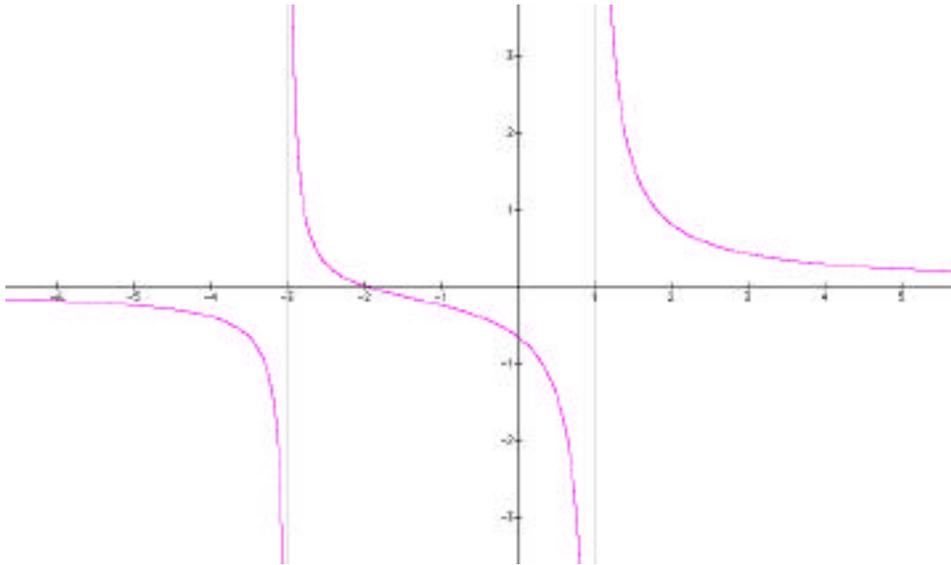


- A. 346,665 km
- B. 347,125 km
- C. 346,205 km
- D. 345,950 km
- E. None of these.

- 6) Given the following information about $\triangle ABC$, find $\angle C$.
 $\angle A = 110.0^\circ$, $a = 15$, and $b = 21$
- A. 41.7°
 - B. 28.3°
 - C. 24.8°
 - D. 45.2°
 - E. None of these.

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7) What is an equation of the graphed function?



A. $f(x) = \frac{2x-1}{(x+3)(x-1)}$

B. $f(x) = \frac{x-2}{(x-3)(x+1)}$

C. $f(x) = \frac{(x+3)(x-1)}{x+2}$

D. $f(x) = \frac{(x-3)(x+1)}{x-2}$

E. $f(x) = \frac{x+2}{(x+3)(x-1)}$

8) A ship leaves port at 1:00 PM and travels N35°E at the rate 22 mph. A second ship leaves the same port at 2:00 PM and travels S75°E at the rate 51 mph. To the nearest mile, approximately how far apart are the ships at 5:30 PM?

A. 232 miles

B. 172 miles

C. 137 miles

D. 124 miles

E. None of these.

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- 9) An airplane, with an airspeed of 350 miles per hour, is flying in the direction 55° and a 50 mph hour wind is blowing directly **from** the west. What is the ground speed (the resultant) of the airplane? Round to the nearest whole number.

- A. 392 mph
- B. 310 mph
- C. 354 mph
- D. 324 mph
- E. None of these.

Questions 10 and 11: The magnitude and direction of two forces acting at a point P are:

- a) 120 lbs. $N30^\circ W$ b) 50 lbs. $S80^\circ W$

- 10) Approximate the magnitude of the resultant force.

- A. 80.7 lbs.
- B. 144.9 lbs.
- C. 121.7 lbs.
- D. 113.1 lbs.
- E. None of these.

- 11) Approximate the direction of the resultant force.

- A. $N34^\circ W$
- B. $N55^\circ W$
- C. $N49^\circ W$
- D. $N40^\circ W$
- E. None of these.

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12) What is the domain of the function $f(x) = \frac{2}{x^2 + x - 2}$?

- A. $(-\infty, -1) \cup (-1, 2) \cup (2, \infty)$
- B. $(-\infty, -1) \cup (-1, 0) \cup (0, 2) \cup (2, \infty)$
- C. $(-\infty, 0) \cup (0, \infty)$
- D. $(-\infty, -2) \cup (-2, 1) \cup (1, \infty)$
- E. None of these.

13) What is the horizontal asymptote of the function $f(x) = \frac{3x^3 + x - 2}{5x^3 + 3x^2 - 6x + 1}$?

- A. $y = \frac{3}{5}$
- B. $y = 0$
- C. $y = 1$
- D. $y = -2$
- E. None of these.

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

$$3\sin^2 x - 5\sin x + 1 = 0$$

- A. 0.4648, 2.8685
- B. 0.4834, 2.6582
- C. 0.2324, 1.4343
- D. 0.2346, 2.9070
- E. No solution.

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MA 154, Spring 2003
Exam 3 Answer Key

Question	Answer	Letter
1	$6i + 39j$ (None of these)	E
2	$m = \frac{26}{9}$	B
3	$-\frac{1}{\sqrt{10}}$	C
4	112.9°	D
5	346,205 km	C
6	28.3°	B
7	$f(x) = \frac{x+2}{(x+3)(x-1)}$	E
8	172 miles	B
9	392 mph	A
10	144.9 lbs.	B
11	N 49° W	C
12	$(- , -2)$ $(-2, 1)$ $(1,)$	D
13	$y = \frac{3}{5}$	A
14	0.2346, 2.9070	D