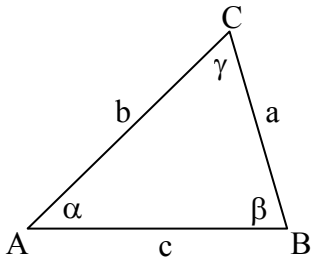
MA 15400
Spring 2011
Exam 3

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:

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

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Covers Lessons 23 to 34, which starts with question #53 of Section 7.6 and then all of Sections 8.1, 8.2, 8.3, and 4.5.

Sketch the function and answer questions 1 and 2: $f(x)=\dfrac{x^2-2x-8}{x^2-2x-15}$

1. What are the vertical asymptotes of the function?

   A. $x=-5, x=3$

   B. $x=-2, x=4$

   C. $x=5, x=-3$

   D. $x=2, x=-4$

   E. None of the above

2. In which intervals is $f(x)>0$?

   A. $(-\infty,-3)\cup(-2,4)\cup(5,\infty)$

   B. $(-3,-2)\cup(4,5)$

   C. $(-2,4)\cup(5,\infty)$

   D. $(-\infty,-3)\cup(-3,0)\cup(5,\infty)$

   E. None of the above

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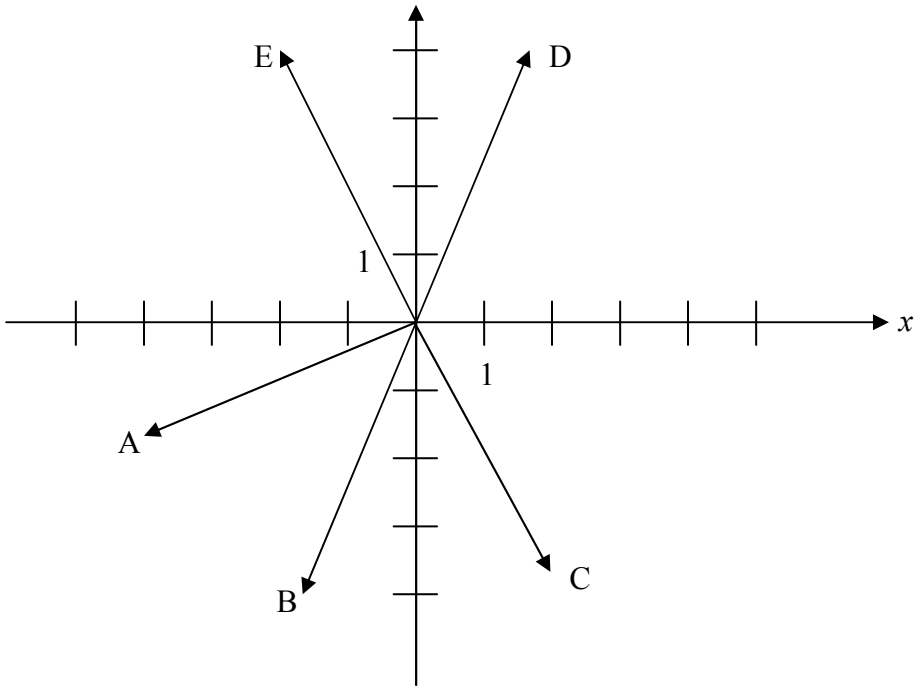
3. If $s = \langle 1,-2 \rangle$, which vector best represents $-2s$?



A. A

B. B

C. C

D. D

E. E

4. Approximate, to four decimal places, the solution(s) of the equation that are in the interval $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$. (Warning: Check the mode of you calculator)

$$3\tan^2 u + 7\tan u + 3 = 0$$

A. $0.3699,-2.7032$

B. $-0.5148,-1.0559$

C. $-0.5657,-1.7676$

D. $0.3543,-1.2165$

E. None of the above.

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5. Approximate the smallest positive angle between the two vectors to the nearest tenth of a degree. $a = \langle -1,6 \rangle$ and $b = \langle 3,-5 \rangle$. (Check calculator mode.)

   A. 162.3°

   B. 171.6°

   C. 165.4°

   D. 158.5°

   E. None of the above.

6. Given ΔABC with $\alpha = 35°, a = 9,$ and $b = 15$ there are two distinct triangles, each with their own value for c. Approximate the smaller of the two values of c to one decimal place.

   A. 7.2

   B. 6.4

   C. 9.6

   D. 6.7

   E. None of the above.

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7. A quarterback releases a football with a speed of 37 ft/sec at an angle of 48° with the horizontal. Approximate the **horizontal** component of the vector of speed. Round your answer to the nearest tenth.

   A. $41.1\,ft/\sec$

   B. $25.6\,ft/\sec$

   C. $31.1\,ft/\sec$

   D. $27.5\,ft/\sec$

   E. None of the above.

8. Given the following information about ΔABC, which of the following best describes the value of c?

   $$\gamma = 78.5°,\ a = 14.3, \text{ and } b = 22.1$$

   A. Between 23.0 and 23.5

   B. Between 22.5 and 23.0

   C. Between 22.0 and 22.5

   D. Between 23.5 and 24.0

   E. None of the above.

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

   $$4mi + 4j,\ 2i - 8j$$

   A. 4

   B. -1

   C. -4

   D. 1

   E. None of the above.

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10. An airplane flies 80 miles from point A in the direction 50° and then travels in the direction 125° for 210 miles. To the nearest mile, approximately how far is the airplane from A?

    A. 264 miles

    B. 243 miles

    C. 225 miles

    D. 251 miles

    E. None of the above.

11. The magnitude and direction of two forces acting at a point P are a = 100 lb. at 30° and b = 35 lb. at 345°. Approximate the direction of the resultant force to the nearest degree.

    A. 12°

    B. 351°

    C. 19°

    D. 356°

    E. None of the above.

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12. Find a vector v of **magnitude 3** that is in the **same direction** of the vector $5i - 12j$.

A. $v = -15i + 36j$

B. $v = \frac{15}{13}i - \frac{36}{13}j$

C. $v = 15i - 36j$

D. $v = \frac{-15}{13}i + \frac{36}{13}j$

E. None of the above.

13. Find a function in x that satisfies the following conditions.

Vertical asymptotes: $x = 2, x = -4$
Horizontal Asymptote: $y = 0$
x-intercept: -5, $f(1) = 12$

A. $f(x) = \frac{-27(x+5)}{(x-2)(x+4)}$

B. $f(x) = \frac{10(x-5)}{(x+2)(x-4)}$

C. $f(x) = \frac{27(x-5)}{(x+2)(x-4)}$

D. $f(x) = \frac{-10(x+5)}{(x-2)(x+4)}$

E. None of the above

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14. $F_{net} = \langle 0, 0 \rangle$ means the total forces are in equilibrium.

Given $F_1 = \langle -4, 7 \rangle, F_2 = \langle -2, -3 \rangle, F_3 = \langle 3, 5 \rangle,$ find an additional force **G** such that equilibrium occurs.

A. $G = \langle 3, -9 \rangle$

B. $G = \langle -5, 7 \rangle$

C. $G = \langle -3, 9 \rangle$

D. $G = \langle 5, -7 \rangle$

E. None of the above.

15. An airplane is flying in the direction 40° with an airspeed of 500 mi/hr, and a 60 mi/hr wind is blowing in the direction 120°. Approximate the ground speed of the airplane. Round your answers to the nearest whole number.

A. 490 mph

B. 499 mph

C. 514 mph

D. 533 mph

E. None of the above.