

## Chapter 5

1. Given  $\cos\left(\frac{\pi}{2} - x\right) = \frac{2}{7}$ , find  $\sin x$ .

- (a)  $\frac{3\sqrt{5}}{7}$       (b)  $\frac{7}{2}$       (c)  $\frac{3\sqrt{5}}{2}$       (d)  $\frac{2}{7}$       (e) None of these

2. Verify the identity:  $\frac{\cos x \csc x}{\cot^2 x} = \tan x$

3. Find all solutions in the interval  $[0, 2\pi)$ :  $\sin x = \frac{1}{4 \sin x}$

- (a)  $\frac{\pi}{6}, \frac{5\pi}{6}$       (b)  $\frac{7\pi}{6}, \frac{11\pi}{6}$       (c)  $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$   
 (d)  $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$       (e) None of these

4. Find all solutions in the interval  $[0, 2\pi)$ :  $\sin 2x + \sin x = 0$

- (a)  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$       (b)  $0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$       (c)  $0, \frac{\pi}{3}$   
 (d)  $0, \pi, \frac{2\pi}{3}, \frac{4\pi}{3}$       (e) None of these

5. Given  $\sin u = -\frac{8}{13}$ , find  $\cos\left(\frac{u}{2}\right)$ . (Assume  $\frac{3\pi}{2} < u < 2\pi$ .)

- (a)  $-\sqrt{\frac{13 - \sqrt{105}}{26}}$       (b)  $-\sqrt{\frac{13 + \sqrt{105}}{26}}$       (c)  $-\sqrt{\frac{13 - \sqrt{233}}{26}}$   
 (d)  $\sqrt{\frac{13 + \sqrt{105}}{26}}$       (e) None of these

6. Verify the identity:  $\frac{\csc x}{\sin x} - \frac{\cot x}{\tan x} = 1$

7. Find all solutions in the interval  $[0, 2\pi)$ :  $2 \sin^2\left(\frac{x}{4}\right) - 3 \cos\left(\frac{x}{4}\right) = 0$

(a)  $\frac{\pi}{3}, \frac{5\pi}{3}$

(b)  $\frac{4\pi}{3}$

(c)  $\frac{4\pi}{3}, \frac{2\pi}{3}$

(d)  $\frac{\pi}{6}, \frac{\pi}{3}$

(e) None of these

8. Evaluate:  $\sin 255^\circ$ . (Use the fact that  $255^\circ = 210^\circ + 45^\circ$ .)

(a)  $\frac{\sqrt{6} - \sqrt{2}}{4}$

(b)  $\frac{\sqrt{2} - \sqrt{6}}{4}$

(c)  $-\frac{\sqrt{2} + \sqrt{6}}{4}$

(d)  $\frac{\sqrt{2} + \sqrt{6}}{4}$

(e) None of these

9. Simplify:  $\sin\left(\frac{4\pi}{3} - x\right) + \cos\left(x + \frac{5\pi}{6}\right)$

(a)  $\cos x - \sin x$

(b)  $-\sqrt{3} \cos x$

(c)  $\sin x - \sqrt{3} \cos x$

(d)  $\sin x$

(e) None of these

10. Find all solutions in the interval  $[0, 2\pi)$ :  $\sin 2x + \sin x = 0$

(a)  $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{2\pi}{3}, \frac{4\pi}{3}$

(b)  $0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$

(c)  $0, \frac{\pi}{3}$

(d)  $0, \pi, \frac{2\pi}{3}, \frac{4\pi}{3}$

(e) None of these

1. Given  $\cot x$  is undefined and  $\cos x > 0$ , find  $\csc x$ .
2. Simplify:  $3 \sin^2 \theta + 2 \cos^2 \theta - 2$ . Use a graphing utility to verify your result.
3. Verify the identity:  $\frac{1 + \sin x}{\cos x \sin x} = \sec x(\csc x + 1)$
4. Verify the identity and confirm it graphically:  $\sin x + \frac{\cos^2 x}{\sin x} = \csc x$
5. Find all solutions in the interval  $[0, 2\pi)$ :  $2 \sin^2 x = \sin x$
6. Find all solutions in the interval  $[0, 2\pi)$ :  $2 \sin^2 2x + 5 \sin 2x - 3 = 0$
7. Find the exact value:  $\frac{\tan 325^\circ - \tan 25^\circ}{1 + \tan 325^\circ \tan 25^\circ}$
8. Use a graphing utility to approximate the solutions in the interval  $[0, 2\pi)$ .

$$\sin\left(x + \frac{\pi}{2}\right) - \sin\left(x - \frac{\pi}{2}\right) = 1$$

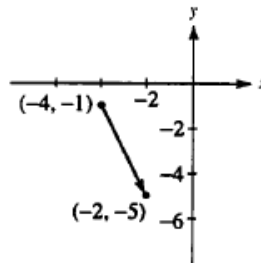
9. Given  $\cos x = -\frac{3}{7}$  and  $\frac{\pi}{2} < x < \pi$ , find  $\cos\left(\frac{x}{2}\right)$ .

**Chapter 6**

1. Given triangle with  $C = 72^\circ$ ,  $A = 15^\circ$ , and  $b = 342.6$ , find  $a$ .  
 (a) 1258.92      (b) 88.79      (c) 6323.1      (d) 326.28      (e) None of these
2. Given triangle  $a = 83$ ,  $b = 98$ , and  $A = 110^\circ$ , find  $C$ .  
 (a)  $57^\circ$       (b)  $41^\circ$       (c) No solution      (d)  $62^\circ, 28^\circ$       (e) None of these
3. Given a triangle with  $a = 17$ ,  $b = 39$ , and  $c = 50$ , find  $A$ .  
 (a)  $16.88^\circ$       (b)  $73.12^\circ$       (c)  $163.12^\circ$       (d)  $106.88^\circ$       (e) None of these
4. Determine the number of acres in a triangular parcel of land if the lengths of the sides measure 1507 feet, 1750 feet, and 970 feet. There are 43,560 square feet in 1 acre.  
 (a) 15.9A      (b) 21.7A      (c) 19.2A      (d) 16.8A      (e) None of these

5. Find the component form of the vector at the right.

- |                              |                             |
|------------------------------|-----------------------------|
| (a) $\langle -2, 4 \rangle$  | (b) $\langle 2, -4 \rangle$ |
| (c) $\langle -6, -6 \rangle$ | (d) $\langle 6, 6 \rangle$  |
| (e) None of these            |                             |

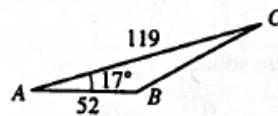


6. Find a unit vector in the direction of  $\mathbf{v}$ :  $\mathbf{v} = 3\mathbf{i} - 3\mathbf{j}$

- |   |                               |   |
|---|-------------------------------|---|
| (a) $3\mathbf{i} - 3\mathbf{j}$                                     | (b) $\mathbf{i} - \mathbf{j}$ | (c) $\frac{\sqrt{2}}{2}\mathbf{i} - \frac{\sqrt{2}}{2}\mathbf{j}$ |
| (d) $\frac{3\sqrt{2}}{2}\mathbf{i} - \frac{3\sqrt{2}}{2}\mathbf{j}$ | (e) None of these             |   |

1. Given triangle with  $A = 102^\circ$ ,  $B = 23^\circ$ , and  $c = 576.1$ , find  $a$ .
2. Given a triangle with  $B = 56^\circ$ ,  $a = 98$ , and  $b = 85$ , find the two possible values of  $C$ .
3. Given a triangle with  $a = 135$ ,  $b = 71.6$ , and  $c = 69$ , find  $B$ .
4. A boat leaves a port and sails 16 miles at a bearing of S  $20^\circ$  E. Another boat leaves the same port and sails 12 miles at a bearing of S  $60^\circ$  W. How far apart are the two boats at this point?
5. A vector  $\mathbf{v}$  has initial point  $(2, 5)$  and terminal point  $(-1, 9)$ . Find its magnitude and direction.
6. Given  $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j}$  and  $\mathbf{w} = 6\mathbf{i} + \mathbf{j}$ . Find the angle between  $\mathbf{v}$  and  $\mathbf{w}$ .

1. Given triangle with  $A = 61^\circ$ ,  $B = 49^\circ$ , and  $c = 5396$ , find  $a$ .
2. Given a triangle with  $A = 37^\circ$ ,  $B = 78^\circ$ , and  $c = 250$ , find the area.
3. Given the triangle to the right, find  $B$ .



4. A golfer drives a ball  $21^\circ$  from a line between the tee and the hole that is 320 yards away. How far is the ball from the hole if the ball landed 190 yards from the tee?
5. A vector  $\mathbf{v}$  has magnitude 27 and direction  $\theta = 216^\circ$ . Find its component form.
6. Two forces, one of 45 pounds and the other of 52 pounds, act on the same object. The angle between these forces is  $25^\circ$ . Find the magnitude of the resultant force.

### Chapter 10

- Find the vertex of the parabola:  $4y^2 + 4y - 16x + 13 = 0$   
 (a)  $(-\frac{1}{2}, \frac{3}{4})$       (b)  $(-1, 3)$       (c)  $(\frac{1}{2}, -\frac{3}{4})$       (d)  $(\frac{3}{4}, -\frac{1}{2})$       (e) None of these
- Find an equation of the parabola with vertex at  $(3, 1)$  and focus at  $(4, 1)$ .  
 (a)  $y^2 - 4x - 2y + 13 = 0$       (b)  $4y^2 - x - 8y + 7 = 0$       (c)  $x^2 - 6x - 4y + 13 = 0$   
 (d)  $4x^2 - 24x - y + 37 = 0$       (e) None of these
- Find the center of the ellipse:  $9x^2 + 4y^2 - 36x - 24y - 36 = 0$   
 (a)  $(2, 3)$       (b)  $(3, -2)$       (c)  $(2\sqrt{3}, 3\sqrt{3})$       (d)  $(6, 48)$       (e) None of these
- Find an equation of the ellipse with minor axis of length 8 and vertices at  $(-9, 3)$  and  $(7, 3)$ .  
 (a)  $4x^2 + 8y^2 - 8x - 48y + 44 = 0$       (b)  $16x^2 + 64y^2 + 32x - 384y - 432 = 0$   
 (c)  $64x^2 - 128y^2 - 128x - 768y - 6976 = 0$       (d)  $x^2 + y^2 + 8x + 8y + 64 = 0$   
 (e) None of these
- Find the center of the hyperbola:  $25y^2 - 144x^2 + 150y - 576x - 3951 = 0$   
 (a)  $(-2, -3)$       (b)  $(2, 3)$       (c)  $(-3, -2)$       (d)  $(3, 2)$       (e) None of these
- Classify the graph of  $2x^2 - 5y^2 + 4x - 6 = 0$ .  
 (a) Circle      (b) Parabola      (c) Ellipse      (d) Hyperbola      (e) None of these

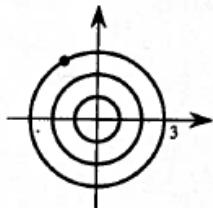
7. Eliminate the parameter and find a corresponding rectangular equation:

$$x = 2 \cos \theta, y = 4 \sin \theta$$

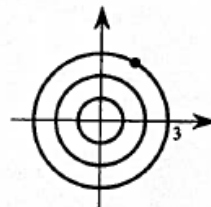
- (a)  $4x + 2y = 1$       (b)  $16x^2 - 4y^2 = 1$       (c)  $4x + 2y = 8$   
 (d)  $16x^2 + 4y^2 = 64$       (e) None of these

8. Plot the point whose polar coordinates are  $(-3, -\frac{\pi}{3})$ .

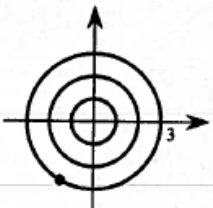
(a)



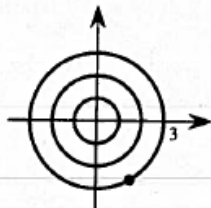
(b)



(c)



(d)



(e) None of these

1. Find the vertex, focus, and directrix of the parabola:  $x^2 - 10x + 12y + 37 = 0$
2. Find the standard equation of the parabola with vertex at  $(0, 0)$  and directrix  $x = 7$ .
3. Find the center of the ellipse:  $5x^2 + 2y^2 - 20x + 24y + 82 = 0$
4. Find an equation of the ellipse with foci at  $(0, 2)$  and  $(0, 8)$  and vertices at  $(0, 0)$  and  $(0, 10)$ .
5. Find the standard equation of the hyperbola with vertices at  $(6, 3)$  and  $(-2, 3)$  and with asymptotes  
 $y = \frac{3}{4}x + \frac{3}{2}$  and  $y = -\frac{3}{4}x + \frac{9}{2}$ .
6. Classify the graph of  $3x^2 + 2y^2 - 6x - 2 = 0$ .
  
7. Eliminate the parameter and find a corresponding rectangular equation:  
 $x = 1 + \cos \theta$ ,  $y = 2 - \sin \theta$
8. Change from polar to rectangular coordinates and graph the equation:  $r = 2 \cos \theta$
9. Convert from rectangular to polar coordinates:  $(0, -4)$
10. Find the maximum value of  $|r|$ :  $r = 1 + \sin 2\theta$
11. Sketch the graph of  $r = 5 \sin 2\theta$ .
12. Identify the graph:  $r = \frac{5}{5 + (1/5) \cos \theta}$

13. Convert from polar to rectangular coordinates:  $(-1, -\sqrt{3})$

(a)  $(2, -\frac{4\pi}{4})$

(b)  $(-2, \frac{\pi}{3})$

(c)  $(-2, \frac{4\pi}{3})$

(d)  $(-2, -\frac{\pi}{3})$

(e) None of these

14. Find the values of  $\theta$  for which  $|r|$  is a maximum:  $r = 5 - 4\sin \theta$

(a)  $0, \pi$

(b)  $\frac{\pi}{2}, \frac{3\pi}{2}$

(c)  $\frac{\pi}{2}$

(d)  $\frac{3\pi}{2}$

(e) None of these

15. Find an equation for the graph at the right.

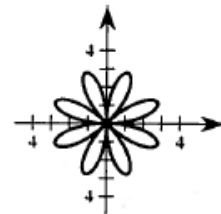
(a)  $r = 3 \sin 4\theta$

(b)  $r^2 = 1 + 4 \sin \theta$

(c)  $r = 3 - 4 \cos \theta$

(d)  $r^2 = 4 \cos 3\theta$

(e) None of these



16. Identify the graph:  $r = \frac{10}{3 - 3 \cos \theta}$

(a) Parabola

(b) Ellipse

(c) Hyperbola

(d) Cardioid

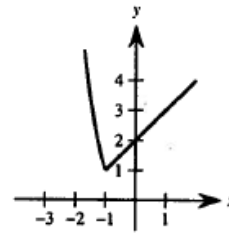
(e) None of these



**Chapter 12**

1. Use the graph to estimate  $\lim_{x \rightarrow 2} f(x)$ .

- (a) 1
- (b) -1
- (c) 0
- (d) Limit does not exist.
- (e) None of these



2. Find  $\lim_{x \rightarrow -3} (-2x^2 + 1)$ .

- (a) 37
- (b) 19
- (c) -17
- (d)  $\pm\sqrt{2}$
- (e) None of these

3. Find  $\lim_{x \rightarrow 5} \csc \frac{\pi x}{4}$ .

- (a) 1
- (b) -1
- (c)  $-\sqrt{2}$
- (d)  $-\frac{1}{\sqrt{2}}$
- (e) None of these

4. Find the limit:  $\lim_{x \rightarrow -4} \frac{x^2 + 11x + 28}{x + 4}$

- (a) 7
- (b) 3
- (c) 0
- (d) Limit does not exist.
- (e) None of these

5. Find  $\lim_{x \rightarrow 0} \frac{\sqrt{x+9} - 3}{x}$ .

- (a) 0
- (b) 1
- (c)  $\infty$
- (d)  $\frac{1}{3}$
- (e) None of these

6. Find the limit:  $\lim_{x \rightarrow 3^+} \sqrt{2x - 5}$

- (a) 1
- (b) 0
- (c)  $2i$
- (d) Does not exist.
- (e) None of these

7. If  $f(x) = -x^2 + x$ , which of the following will calculate the derivative of  $f(x)$ ?

- (a)  $\lim_{h \rightarrow 0} \frac{(-x^2 + x + h) - (-x^2 + x)}{h}$
- (b)  $\lim_{h \rightarrow 0} \frac{[-(x+h)^2 + (x+h)] - (-x^2 + x)}{h}$
- (c)  $\frac{[-(x+h)^2 + (x+h)] - (-x^2 + x)}{h}$
- (d)  $\frac{(-x^2 + x + h) - (-x^2 + x)}{h}$
- (e) None of these

8. Find the limit (if it exists):  $\lim_{x \rightarrow \infty} \frac{x^2 + 2x}{3x^2 - 6x + 1}$

- (a)  $-\frac{3}{2}$
- (b) 0
- (c)  $\frac{1}{3}$
- (d) Limit does not exist.
- (e) None of these