(1)

Section 8.1 Parabolas

1. The parabola given by the equation $9y-3x^2+6x-4=0$ has

A) a vertex at $\left(1,\frac{1}{3}\right)$ and opens to the right

B) a vertex at $\left(1,\frac{1}{3}\right)$ and opens up

C) a vertex at $\left(-1,\frac{1}{3}\right)$ and opens to the right

D) a vertex at $\left(1,\frac{1}{9}\right)$ and opens up

E) a vertex at $\left(1,\frac{1}{9}\right)$ and opens to the right

2. The focus and directrix of the parabola $x^2-6x+y+10=0$ respectively are

A) $\left(\frac{11}{4},-1\right)$, $x=\frac{13}{4}$

B) $\left(3,-\frac{3}{4}\right), y=-\frac{1}{4}$

C) $\left(3,-\frac{5}{4}\right), y=-\frac{3}{4}$

D) $\left(3,-\frac{3}{4}\right), y=-\frac{5}{4}$

E) $\left(3,-\frac{5}{4}\right), x=-\frac{3}{4}$

(2)

3. The focus of the parabola given by the equation $2(2y-4)^2 = 64(x-1)$ is equal to

A) $(3,1)$

B) $(4,1)$

C) $(3,2)$

D) $(2,3)$

E) $(1,4)$

4. **The equation of the parabola with vertex at $(-2,3)$ and focus at $(0,3)$ is**

A) $(x+3)^2 = -4(y-2)$

B) $(x+2)^2 = -8(y-3)$

C) $(y-3)^2 = -8(x+2)$

D) $(x+2)^2 = 8(y-3)$

E) $(y-3)^2 = 8(x+2)$

5. If $V = (a,b)$ and $F = (c,d)$ are the vertex and focus of the parabola given by the equation $3x^2 + 6x - 4y + 15 = 0$, then $a+b+c+d =$

A) $\frac{11}{3}$

B) $\frac{23}{3}$

C) $\frac{15}{3}$

D) $\frac{13}{3}$

E) $\frac{14}{3}$

6. . A parabola has its fo---

(illegible)

A) $-10y-12x+13=0$

B) $(x-2)^2=4(y-4)$

C) $y^2-10y+12x+37=0$

D) $x^2-4x+4y-12=0$

E) $y^2-12y-10x-37=0$

7. The equation in standard form of the parabola with directrix $x=4$ and focus $(0,-3)$ is given by:

a) $(x-2)^2=-2(y+3)$

b) $(x-2)^2=-8(y+3)$

c) $(y+3)^2=-8(x-2)$

d) $(y+3)^2=-2(x-2)$

e) $(y+3)^2=2(x-2)$

8. The vertex and directrix of the parabola given by $y-4=\frac{1}{16}(x+4)^2$ are

(a) vertex: $(-4,4)$; directrix: $y=0$

(b) vertex: $(4,-4)$; directrix: $y=-8$

(c) vertex: $(-4,4)$; directrix: $y=-12$

(d) vertex: $(4,-4)$; directrix: $x=0$

(e) vertex: $(-4,4)$; directrix: $y=8$

9. The coordinates of the focus of the parabola $8x - y^2 + 4y - 12 = 0$ are

(a) $(3, 2)$

(b) $(-3, 2)$

(c) $(3, -2)$

(d) $(3, 4)$

(e) $(2, 4)$

10. The equation in standard form of the parabola that has vertex $(3,-5)$, has its axis of symmetry parallel to the x-axis and passes through the point $(4,3)$ is:

a) $(y+5)^2 = 64(x-3)$

b) $(y+5)^2 = -16(x-3)$

c) $(y+5)^2 = 16(x-3)$

d) $(x-3)^2 = 64(y+5)$

e) $(x-3)^2 = 16(y+5)$

11. The equation of the parabola with focus $(-2, 4)$ and directrix $x = 4$ is

(a) $(y-4)^2 = -12(x-1)$

(b) $(x-4)^2 = -12(y-1)$

(c) $(x+1)^2 = 12(y-2)$

(d) $(y+1)^2 = 12(x-2)$

(e) $(y-2)^2 = 12(x-4)$

12. The equation of the **directrix** of the parabola $(3x+6)^2 = 18y - 36$ is :

a) $x = -\frac{7}{2}$

b) $x = -\frac{5}{2}$

c) $y = \frac{7}{2}$

(d) $y = \frac{3}{2}$

e) $y = -\frac{5}{2}$

13. The equation of the **directrix** of the parabola that has vertex $(-4, 1)$, has its axis of symmetry parallel to the y axis, and passes through the point $(-2, 2)$ is given by

(a) $y = 0$

(b) $y = -1$

(c) $x = 2$

(d) $y = -2$

(e) $x = 2$

14. The equation of the parabola with vertex at $(-1, 2)$ and focus $(-1, 3)$ is

(a) $(x+1)^2 = 4(y-2)$

(b) $(x-1)^2 = 4(y+2)$

(c) $(y+1)^2 = 4(x-2)$

(d) $(y-2)^2 = -4(x+1)$

(e) $(x+1)^2 = -4(y-2)$

15. The equation of the parabola with focus at $(-8,1)$ and directrix $x-4=0$ is

(a) $(y-1)^2=-24(x+2)$

(b) $(y-1)^2=-6(x+2)$

(c) $(x+2)^2=-24(y-1)$

(d) $(x+2)^2=24(y-1)$

(e) $(y+1)^2=-24(x-2)$

16. The vertex and directrix of the parabola given by $3x+4y^2-8y+6=0$ are

A) Vertex: $\left(-\frac{1}{3},1\right)$; directrix: $x=-\frac{23}{48}$

B) Vertex: $\left(\frac{1}{3},1\right)$; directrix: $x=-\frac{25}{48}$

C) Vertex: $\left(-\frac{2}{3},1\right)$; directrix: $x=-\frac{41}{48}$

D) Vertex: $\left(\frac{2}{3},1\right)$; directrix: $x=-\frac{41}{16}$

E) Vertex: $\left(-\frac{2}{3},1\right)$; directrix: $x=-\frac{23}{48}$

17. A parabola has equation $3x^2+2mx+8y=-24$, its vertex is $(3,k)$. Then the value of k is

A) $\frac{3}{8}$

B) 3

C) -9

D) 24

E) 1

18. The equation of a parabola with vertex (4,2) which passes through the point (5,−3) is:

A) $y = -\frac{1}{81}(x+4)^2 + 2$

B) $y = \frac{1}{81}(x-4)^2 - 2$

C) $y = -\frac{5}{81}(x+4)^2 + 2$

D) $y = -5(x-4)^2 + 2$

E) $y = -(x-4)^2 + 2$

19. If the graphs of the parabola $y = x^2 - 4x + 3$ and the line $y - 2x = k$ intersect at only one point, then the value of k is equal to:

a) −6

b) 6

c) 3

d) −3

e) −1

20. The equation of the parabola with vertex (-3,5) that has a horizontal axis of symmetry and passes through the point (5,9) is

A) $(x-3)^2 = 16(y+5)$

B) $(y-3)^2 = 2(x+5)$

C) $(y-5)^2 = 16(x+3)$

D) $(x+3)^2 = 16(y-5)$

E) $(y-5)^2 = 2(x+3)$

21. If the parabola

$$y = ax^2 + bx + c$$

contains the points $(0,1)$ $(1,4)$ $(-1,2)$,

then the sum $a + b + c$ is equal to

(a) 5
(b) 4
(c) 1
(d) -1
(e) 6

22. **The coordinates of the focus** of the parabola that passes through the origin and the points $(-3, 12)$ and $(3, 12)$ are

(a) $\left(0, \frac{3}{16}\right)$

(b) $\left(0, \frac{3}{4}\right)$

(c) $\left(0, \frac{5}{16}\right)$

(d) $\left(0, -\frac{3}{4}\right)$

(e) $\left(0, \frac{1}{16}\right)$

Section 8.2 Ellipses

(1)

1. The eccentricity of the ellipse $4x^2 + y^2 - 1 = 0$ is

A) $\frac{\sqrt{3}}{2}$

B) $\frac{3\sqrt{5}}{4}$

C) $\frac{\sqrt{5}}{2}$

D) $\sqrt{3}$

E) $\frac{\sqrt{5}}{8}$

2. The foci of the ellipse $9(x-1)^2 + 25(y+1)^2 = 225$ are

A) $(-3,-1),(5,-1)$

B) $(-4,-1),\quad (6,-1)$

C) $(-5,0),\ (5,\ 0)$

D) $(3,\ 1),\ (-5,1)$

E) $(1,-5),\ (1,\ 3)$

(2)

3. One of the vertices of the ellipse given by the equation $8x^2+25y^2-48x+50y=-47$ is equal to

A) $(2,-5)$

B) $(2,-3)$

C) $\left(\frac{1}{2},-1\right)$

D) $(-1,\frac{1}{3})$

E) $(12,-1)$

4. The equation of an ellipse in the standard form with foci $(-2,3)$ and $(2,3)$ and major axis of length 8 is equal to:

A) $\frac{x^2}{4}+\frac{(y-3)^2}{16}=1$

B) $\frac{x^2}{16}+\frac{(y-3)^2}{12}=1$

C) $\frac{(x-3)^2}{16}+\frac{y^2}{9}=1$

D) $\frac{x^2}{12}+\frac{(y-3)^2}{16}=1$

E) $\frac{x^2}{16}+\frac{(y-3)^2}{9}=1$

5. The equation of the ellipse in the standard form with vertices $(-2,4)$ and $(-2,-2)$, and passing through $(0,1)$ is

(a) $\dfrac{(x+2)^2}{4}+\dfrac{(y-1)^2}{9}=1$

(b) $\dfrac{(x+2)^2}{4}+\dfrac{(y-1)^2}{25}=1$

(c) $\dfrac{(x-2)^2}{4}+\dfrac{(y-1)^2}{25}=1$

(d) $\dfrac{(x+2)^2}{3}+\dfrac{(y-2)^2}{12}=1$

(e) $\dfrac{(x-2)^2}{4}+\dfrac{(y+1)^2}{9}=1$

6. The eccentricity of the ellipse $9x^2+4y^2+36x-8y+4=0$ is equal to

(a) $\dfrac{\sqrt{5}}{3}$

(b) $\dfrac{\sqrt{5}}{4}$

(c) $\dfrac{\sqrt{11}}{3}$

(d) $\dfrac{\sqrt{13}}{4}$

(e) $\dfrac{4}{5}$

7. The eccentricity of the ellipse $9x^2+16y^2-36x+96y+36=0$ is

a) $\frac{\sqrt{7}}{4}$

b) $\frac{\sqrt{7}}{3}$

c) $\frac{\sqrt{13}}{3}$

d) $\frac{\sqrt{13}}{5}$

e) $\frac{5}{4}$

8. The length of the major axis of an ellipse with foci at $(-1, 2)$ and $(3, 2)$ that passes through the point $(3, 5)$ is

A) 12

B) 8

C) 4

D) 10

E) 6

9. The equation of the ellipse with vertices at $(7,3)$ and $(-3,3)$ and one focus at $(-1,3)$ is

A) $\frac{(x-2)^2}{25}+\frac{(y-3)^2}{16}=1$

B) $\frac{(x+2)^2}{25}+\frac{(y+3)^2}{64}=1$

C) $\frac{(x-2)^2}{25}+\frac{(y-3)^2}{64}=1$

D) $\frac{(x+2)^2}{64}+\frac{(y-3)^2}{25}=1$

E) $\frac{(x+2)^2}{25}+\frac{(y-3)^2}{21}=1$

(5)

10. The equation of an ellipse with eccentricity $\frac{1}{4}$ and foci at $(-2, 4)$ and $(-2, -2)$ is

(a) $\dfrac{(x+2)^2}{135} + \dfrac{(y-1)^2}{144} = 1$

(b) $\dfrac{(x+2)^2}{135} + \dfrac{(y-3)^2}{144} = 1$

(c) $\dfrac{(x-2)^2}{144} + \dfrac{(y+1)^2}{135} = 1$

(d) $\dfrac{(x-2)^2}{12} + \dfrac{(y+1)^2}{\sqrt{135}} = 1$

(e) $\dfrac{(x+2)^2}{\sqrt{135}} + \dfrac{(y-1)^2}{12} = 1$

11. Which of the following is the equation, in standard form, of the ellipse consisting of all points in the plane the sum of whose distances from $(0, 0)$ and $(4, 0)$ is 8

(a) $\dfrac{(x-2)^2}{16} + \dfrac{y^2}{12} = 1$

(b) $\dfrac{x^2}{16} + \dfrac{(y-2)^2}{12} = 1$

(c) $\dfrac{(x-4)^2}{64} + \dfrac{y^2}{16} = 1$

(d) $\dfrac{x^2}{16} + \dfrac{(y-4)^2}{64} = 1$

(e) $\dfrac{(x-2)^2}{8} + \dfrac{y^2}{64} = 1$

12. One of the foci of the ellipse $\frac{(x-3)^2}{16}+\frac{(y+2)^2}{25}=1$ is at

(a) $(3,-5)$

(b) $(1,-2)$

(c) $(3,-9)$

(d) $(7,-2)$

(e) $(3,-1)$

13. If the foci of the ellipse

$$5x^2+9y^2-20x+54y+56=0$$

are (m,n) and (p,q), then $m+n+p+q$ is equal to

(a) -2

(b) 1

(c) -3

(d) 2

(e) 3

14. The **length of the major axis** of the ellipse with center $(-4,1)$, minor axis parallel to the y-axis and of length 8, and passing through $(0,3)$ is equal to

(a) $\frac{16\sqrt{3}}{3}$

(b) $32\sqrt{3}$

(c) $\frac{9}{2}\sqrt{3}$

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

(e) $\frac{25\sqrt{3}}{3}$

15. The equation in standard form of the ellipse with eccentricity $\frac{2}{5}$ and foci (-1,3) and (3,3) is given by the equation:

a) $\frac{(x+1)^2}{21}+\frac{(y+3)^2}{25}=1$

b) $\frac{(x-1)^2}{25}+\frac{(y-3)^2}{16}=1$

c) $\frac{(x-1)^2}{25}+\frac{(y-3)^2}{21}=1$

d) $\frac{(x-1)^2}{25}+\frac{(y-3)^2}{9}=1$

e) $\frac{(x-1)^2}{16}+\frac{(y-3)^2}{9}=1$

16. Let $P(3,1)$ be a point on an ellipse whose foci are at $F_1(-1,4)$ and $F_2(-1,-2)$, then the length L of the major axis and the eccentricity e of the ellipse are :

a) $L=10$, and $e=\frac{3}{5}$

b) $L=8$, and $e=\frac{3}{5}$

c) $L=10$, and $e=\frac{4}{5}$

d) $L=25$, and $e=\frac{3}{4}$

e) $L=10$, and $e=\frac{16}{25}$

17. The coordinates of one of the foci of the ellipse that has eccentricity $\frac{2}{3}$, minor axis of length $2\sqrt{20}$ on the x-axis and center at $(0,0)$ is:

a) $(0,4)$

b) $(-4,0)$

c) $(0,-8)$

d) $(0,-6)$

e) $(2,0)$

18. If e is the eccentricity, and L the length of minor axis of the ellipse $4x^2+8y^2=12$, then $\frac{L}{e}=$

A) $2\sqrt{3}$

B) $\frac{\sqrt{2}}{2}$

C) $\frac{\sqrt{6}}{2}$

D) $2\sqrt{2}$

E) $\frac{\sqrt{3}}{3}$

19. If (h,k) is the center of the ellipse $25x^2+16y^2-150x+64y-111=0$ and e is its eccentricity, then $h+k+e$ is equal to:

A) $\frac{8}{5}$

B) $-\frac{2}{5}$

C) $\frac{3}{5}$

D) $\frac{7}{5}$

E) $-\frac{1}{5}$

20. The set of all values of k for which the equation $9x^2-18x+4y^2+16y+k=0$ is an ellipse is

A) $(-\infty,25)$

B) $(25,\infty)$

C) $\{-11\}$

D) $\{-1\}$

E) $\{24\}$

(1)

Section 8.3 Hyperbolas

1. The equation of the hyperbola that passes through the point $(2, 3)$ and has the foci $(2, 0)$ and $(-2, 0)$ is

A) $\frac{x^2}{8} + \frac{y^2}{18} = 1$

B) $\frac{y^2}{3} - \frac{x^2}{2} = 1$

C) $x^2 - \frac{y^2}{3} = 1$

D) $\frac{x^2}{4} - \frac{y^2}{3} = 1$

E) $\frac{x^2}{2} - \frac{y^2}{9} = 1$

2. The vertices and the foci of the hyperbola $9x^2 - 4y^2 + 36x - 8y + 68 = 0$ are

A) $(-5,-1), (1,-1), (-2-\sqrt{13},-1), (-2+\sqrt{13},-1)$

B) $(-1,1), (5,1), (2-\sqrt{13},1), (2+\sqrt{13},1)$

C) $(-1,-5), (-1,1), (-1,-2-\sqrt{13}), (-1,-2+\sqrt{13})$

D) $(2,-2), (2,4), (2,-1-\sqrt{13}), (2,-1+\sqrt{13})$

E) $(-2,-4), (-2,2), (-2,-1-\sqrt{13}), (-2,-1+\sqrt{13})$

(2)

3. The eccentricity of the hyperbola given by $9y^2 - 36x^2 - 4 = 0$ is

(a) $\frac{\sqrt{5}}{2}$

(b) $\frac{\sqrt{3}}{2}$

(c) $\frac{\sqrt{17}}{4}$

(d) $\frac{1}{2}$

(e) $\frac{3}{2}$

4. The equation of the hyperbola with vertices $(-2,10)$ and $(-2,2)$ and eccentricity $e = \frac{5}{4}$ is:

A) $\frac{(y-6)^2}{9} - \frac{(x+2)^2}{16} = 1$

B) $\frac{(y+2)^2}{16} - \frac{(x-2)^2}{9} = 1$

C) $\frac{(y-6)^2}{25} - \frac{(x+2)^2}{16} = 1$

D) $\frac{(y-10)^2}{16} - \frac{(x+2)^2}{9} = 1$

E) $\frac{(y-6)^2}{16} - \frac{(x+2)^2}{9} = 1$

3

5. Given that a hyperbola is centered at $(3,3)$, passing through the point $(6,1)$ and has a transverse axis parallel to the x-axis. If the slope of one of its asymptotes is 2, then its vertices are

(a) $(3+2\sqrt{2},3)$, $(3-2\sqrt{2},3)$

(b) $(3,3+2\sqrt{2})$, $(3,3-2\sqrt{2})$

(c) $(3,11)$, $(3,-5)$

(d) $(11,3)$, $(-5,3)$

(e) $(3,\frac{\sqrt{7}}{2},3)$, $(3-\frac{\sqrt{7}}{2},3)$

6. The equation of the asymptote with positive slope of the hyperbola $4x^2-9y^2-16x+54y-29=0$ is

(a) $2x-3y+5=0$

(b) $4x-9y+19=0$

(c) $2x-6y+10=0$

(d) $4x-3y+1=0$

(e) $3x-4y+6=0$

7. A hyperbola with center $(2,7)$ is passing through the point $(4,5)$ and has one asymptote with slope 2 and its tranverse axis is horizontal. Its equation is

A) $4x^2-16x-y^2+14y-45=0$

B) $4x^2+16x-y^2+14y+81=0$

C) $4x^2-8x-y^2+14y-54=0$

D) $4x^2-4x-y^2+6y-144=0$

E) $4y^2+8y-x^2+14x-54=0$

8. The equation in standard form of the hyperbola with vertices $(2,3)$ and $(-2,3)$, and eccentricity $\frac{5}{2}$ is given by

(a) $\frac{x^2}{4} - \frac{(y-3)^2}{21} = 1$

(b) $\frac{(x-2)^2}{4} - \frac{(y-6)}{21} = 1$

(c) $\frac{x^2}{16} - \frac{(y-3)^2}{25} = 1$

(d) $\frac{(x-4)^2}{4} - \frac{(y-3)^2}{21} = 1$

(e) $\frac{x^2}{4} - \frac{(y-3)^2}{36} = 1$

9. The equation in standard form of the hyperbola that has foci $(0,3)$ and $(0,-3)$ and passes through the point $\left(\frac{5}{2},3\right)$ is:

a) $\frac{y^2}{4} - \frac{x^2}{5} = 1$

b) $\frac{y^2}{8} - \frac{x^2}{5} = 1$

c) $\frac{y^2}{4} - \frac{x^2}{10} = 1$

d) $\frac{x^2}{16} - \frac{y^2}{25} = 1$

e) $\frac{x^2}{4} - \frac{y^2}{5} = 1$

5

10. The coordinates of one of the foci of the hyperbola

$$\frac{(x-2)^2}{9} - \frac{(y+3)^2}{16} = -1$$

are :

a) (2,−1)

b) (2,9)

c) (2,2)

d) (−3,7)

e) (−3,5)

11. The coordinates of one of the foci of the hyperbola $9(y-1)^2 - 16(x+1)^2 = 144$ are:

a) (−1,4)

b) (−1,6)

c) (−3,4)

d) (−3,6)

e) (−4,6)

6

12. The equation of **one of the asymptotes** of the hyperbola

$$8x^2 - 2y^2 + 32x + 8y - 1 = 0$$

is:

a) $y = 2x - 8$

b) $y = 4x + 7$

c) $y = 2x + 6$

d) $y = 4x + 9$

e) $y = 2x + 10$

13. One equation of the asymptotes of the hyperbola $4x^2 - 25y^2 + 16x + 50y - 109 = 0$ is:

a) $y = \frac{2}{5}x + \frac{9}{5}$

b) $y = \frac{2}{5}x + 1$

c) $y = \frac{-2}{5}x - \frac{9}{5}$

d) $y = \frac{2}{5}x + 9$

e) $y = \frac{-2}{5}x + 1$

7

14. The equations of the asymptotes of the hyperbola $16y^2-9x^2-64y-18x-89=0$ are

A) $4y-3x-11=0$ and $4y+3x-5=0$

B) $4y-3x+11=0$ and $4y+3x+5=0$

C) $4y-3x-5=0$ and $4y+3x+11=0$

D) $4y-3x+1=0$ and $4y+3x-1=0$

E) $x-y=0$ and $x+y=0$

15. The equation of one of the asymptotes of the hyperbola $4x^2-y^2-8x-2y-13=0$ is:

a) $y=2x+7$

b) $y=2x-3$

c) $y=2x-8$

d) $y=x-4$

e) $y=2x+6$

16. The equation of a hyperbola with vertices (4, 5), (4, 1) and asymptotes $y-3=\pm 7(x-4)$ is given by

A) $\dfrac{(y-4)^2}{4}-\dfrac{49(x-3)^2}{4}=1$

B) $\dfrac{49(x-4)^2}{4}-\dfrac{(y-3)^2}{4}=1$

C) $\dfrac{(y-3)^2}{4}-\dfrac{49(x-4)^2}{4}=1$

D) $\dfrac{4(x-4)^2}{49}-\dfrac{(y-3)^2}{4}=1$

E) $\dfrac{(y-3)^2}{4}-\dfrac{4(x-4)^2}{49}=1$

8

17. The asymptotes of the hyperbola $81x^2+162x-4y^2+16y+29=0$ are:

A) $3y-2x-12=0$ and $3y+2x+6=0$

B) $2y-9x-13=0$ and $2y+9x+5=0$

C) $9y-2x-8=0$ and $9y+2x+3=0$

D) $2y-3x-11=0$ and $2y+3x+9=0$

E) $9y-2x-10=0$ and $9y+2x+4=0$

18. One of the equations of the asymptote for the hyperbola $4x^2-3y^2+8x+16=0$ is

A) $y=-\frac{\sqrt{3}}{2}(x+1)$

B) $y=-\frac{2\sqrt{3}}{3}(x+1)$

C) $y=\frac{2\sqrt{3}}{3}(x-1)$

D) $y=\frac{3\sqrt{3}}{2}(x+1)$

E) $y=\frac{\sqrt{3}}{2}(x-1)$

19. Slopes of the asymptotes of the hyperbola $25x^2-9y^2+100x-54y+10=0$ are

A) $\pm\frac{5}{3}$

B) $\pm\frac{2}{5}$

C) $\pm\frac{2}{3}$

D) ± 2

E) ± 3

9

20. If $y=\frac{2}{3}x+A$ and $y=-\frac{2}{3}x+B$ are the asymptotes of the hyperbola given by the equation $4(x-2)^2-9(y-3)^2=-36$ then $A+B$ is equal to:

a) 6

b) $\frac{1}{3}$

c) 4

d) $-\frac{1}{3}$

e) 0

21. The graphs of the line $3x-y=0$ and the hyperbola $9x^2-4y^2=36$:

a) intersect at more than four points
b) intersect at one point only
c) intersect at two points only
d) intersect at four points
e) do not intersect

22. The vertices of the hyperbola given by the equation $16x^2-9y^2-64x-72y=224$ are

A) $(-2,-4)$ *and* $(6,-4)$

B) $(2,-8)$ *and* $(2,0)$

C) $(2,-7)$ *and* $(2,-1)$

D) $(-1,-4)$ *and* $(5,-4)$

E) $(2,-4)$ *and* $(0,0)$