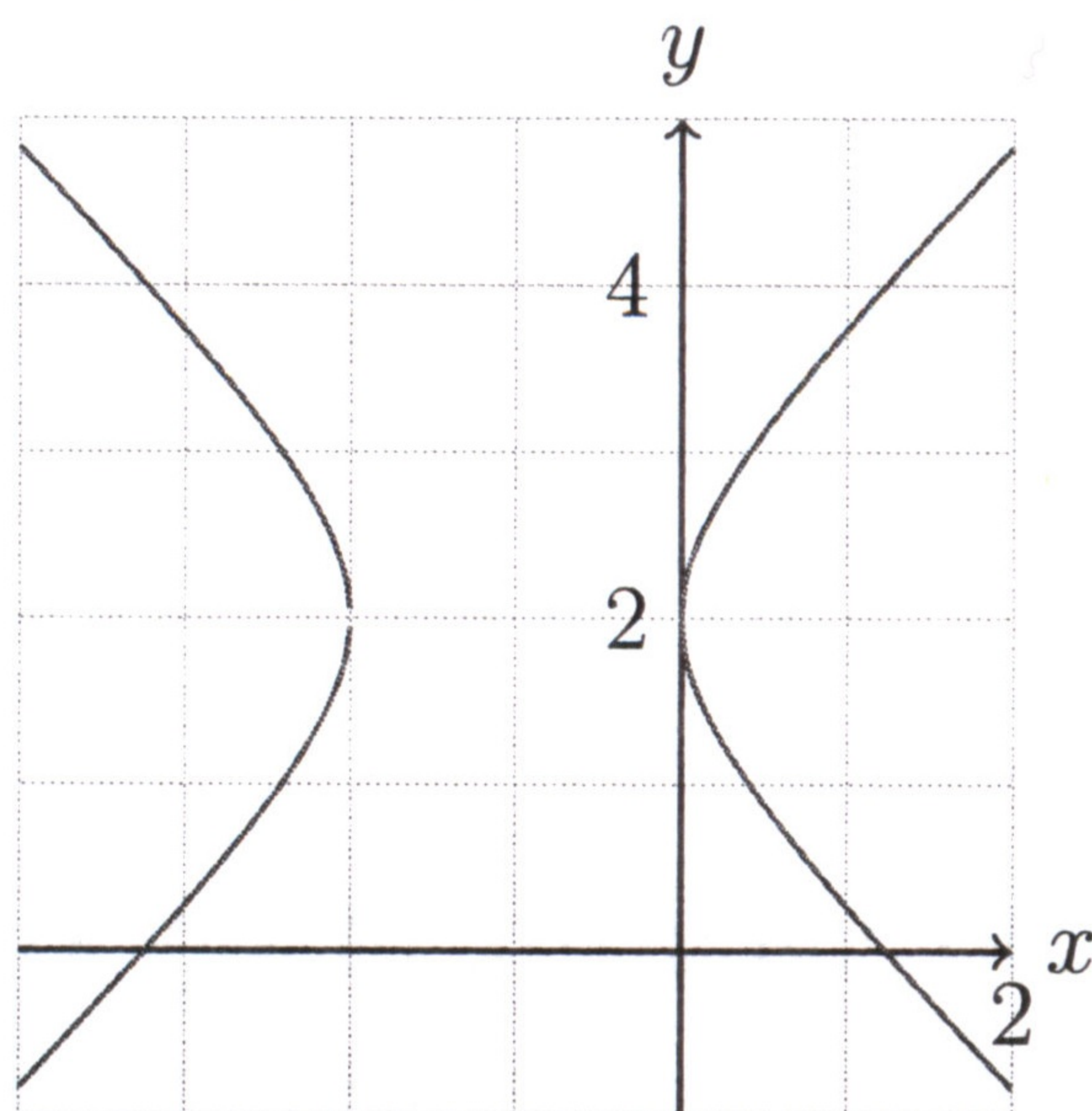


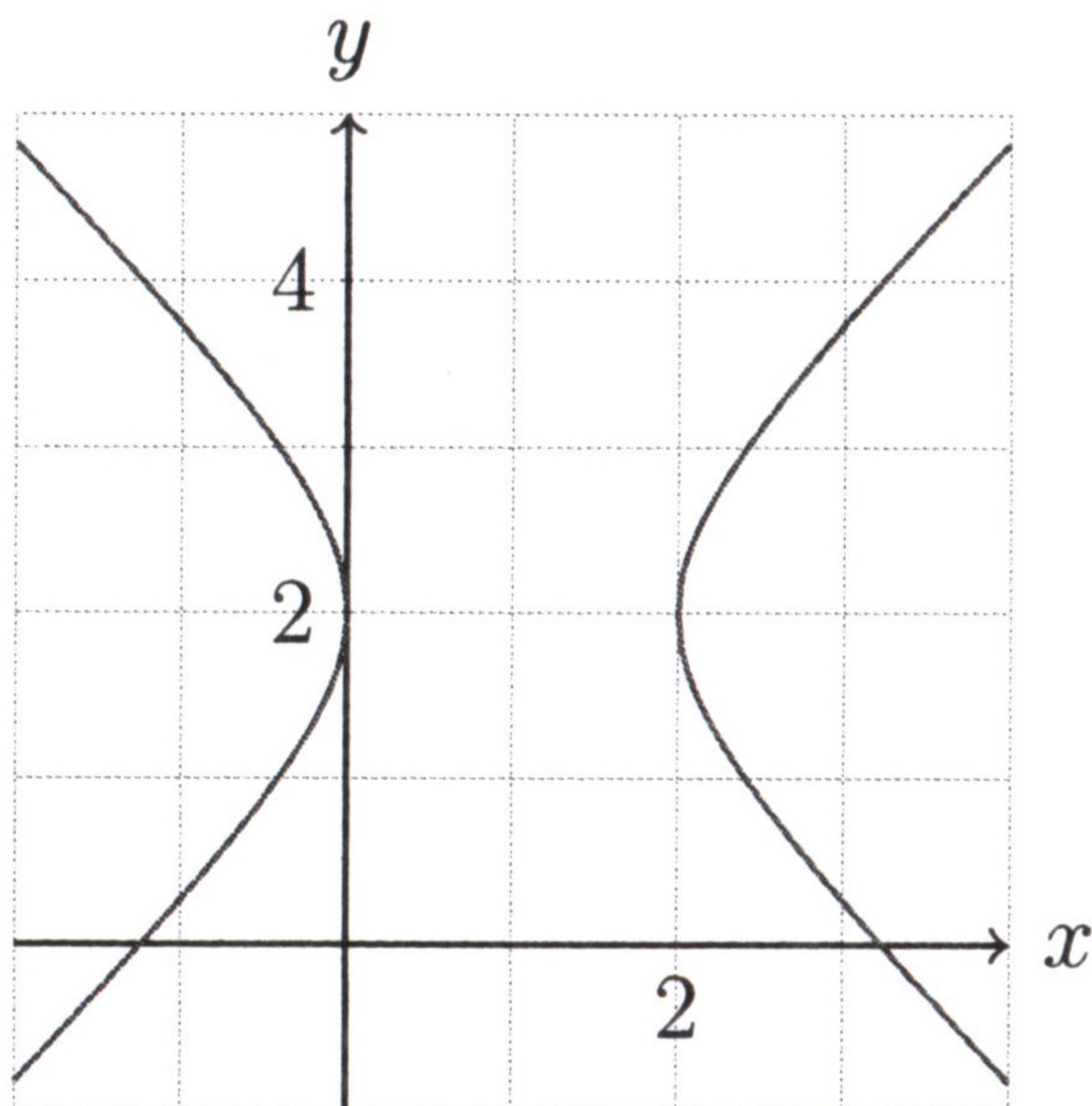
1. Which one of the conics is represented by the equation $4x^2 + y^2 + 8x - 2y + 1 = 0$?
- A. circle
 - B. ellipse (that is not a circle)
 - C. parabola
 - D. hyperbola
 - E. None of these are correct.
2. Find the oblique asymptotes of the hyperbola $\frac{x^2}{4} - \frac{y^2}{49} = 1$.
- A. $y = \pm x$
 - B. $y = \pm \frac{7}{2}x$
 - C. $y = \pm \frac{2}{7}x$
 - D. $y = \pm \frac{4}{49}x$
 - E. $y = \pm \frac{49}{4}x$

3. Find the graph of the hyperbola $x^2 - y^2 - 2x - 4y + 2 = 0$.

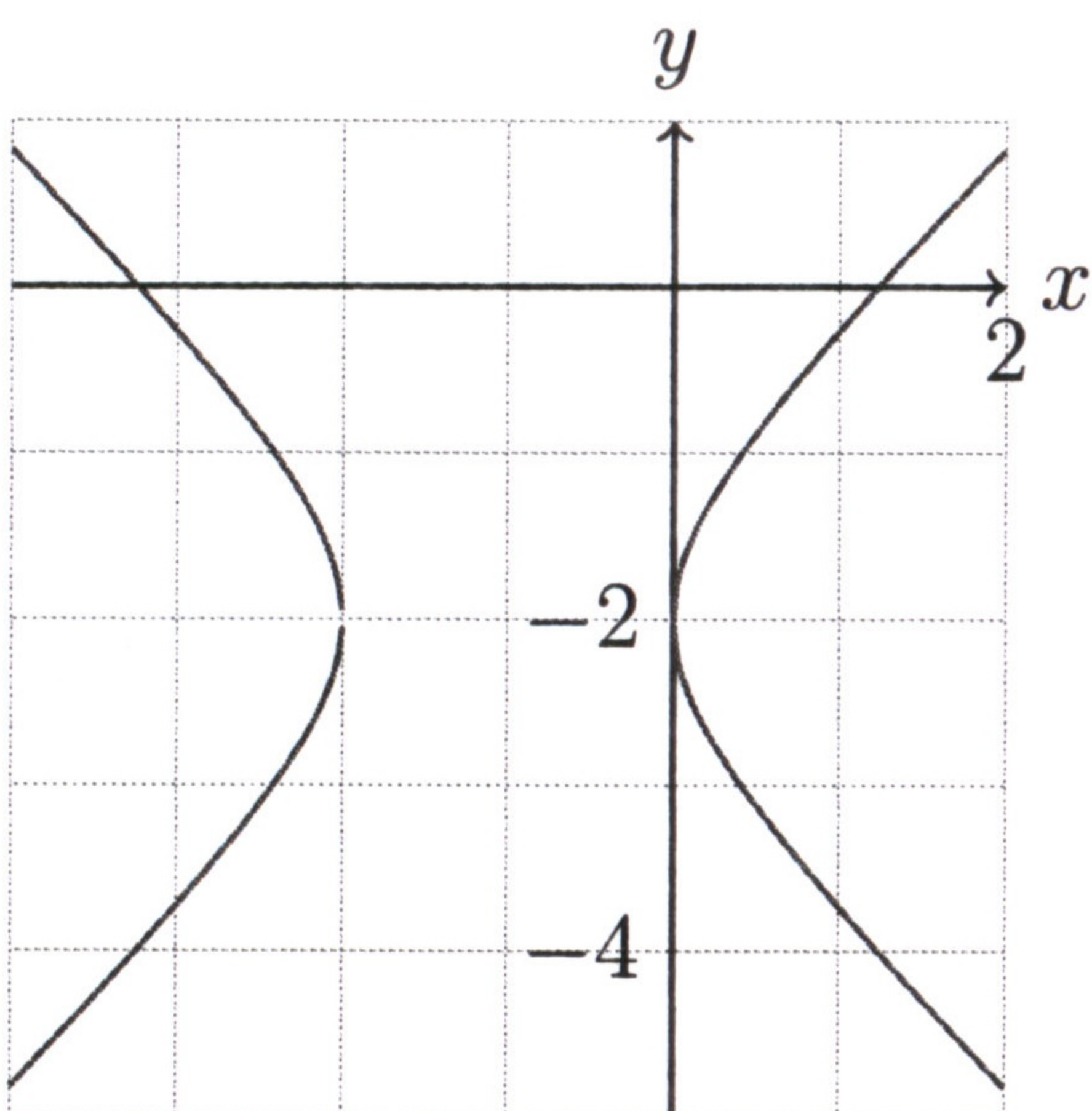
A.



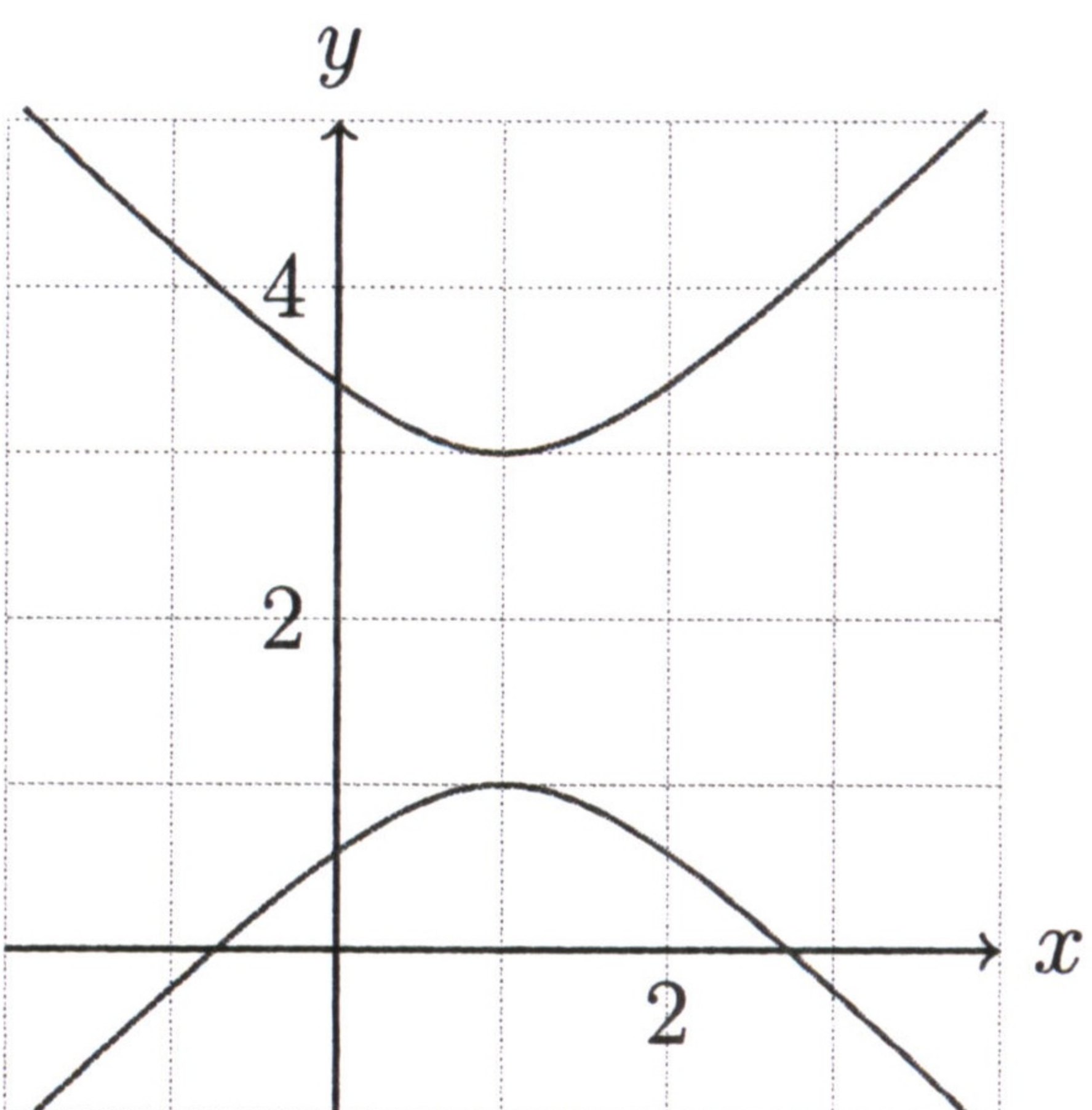
B.



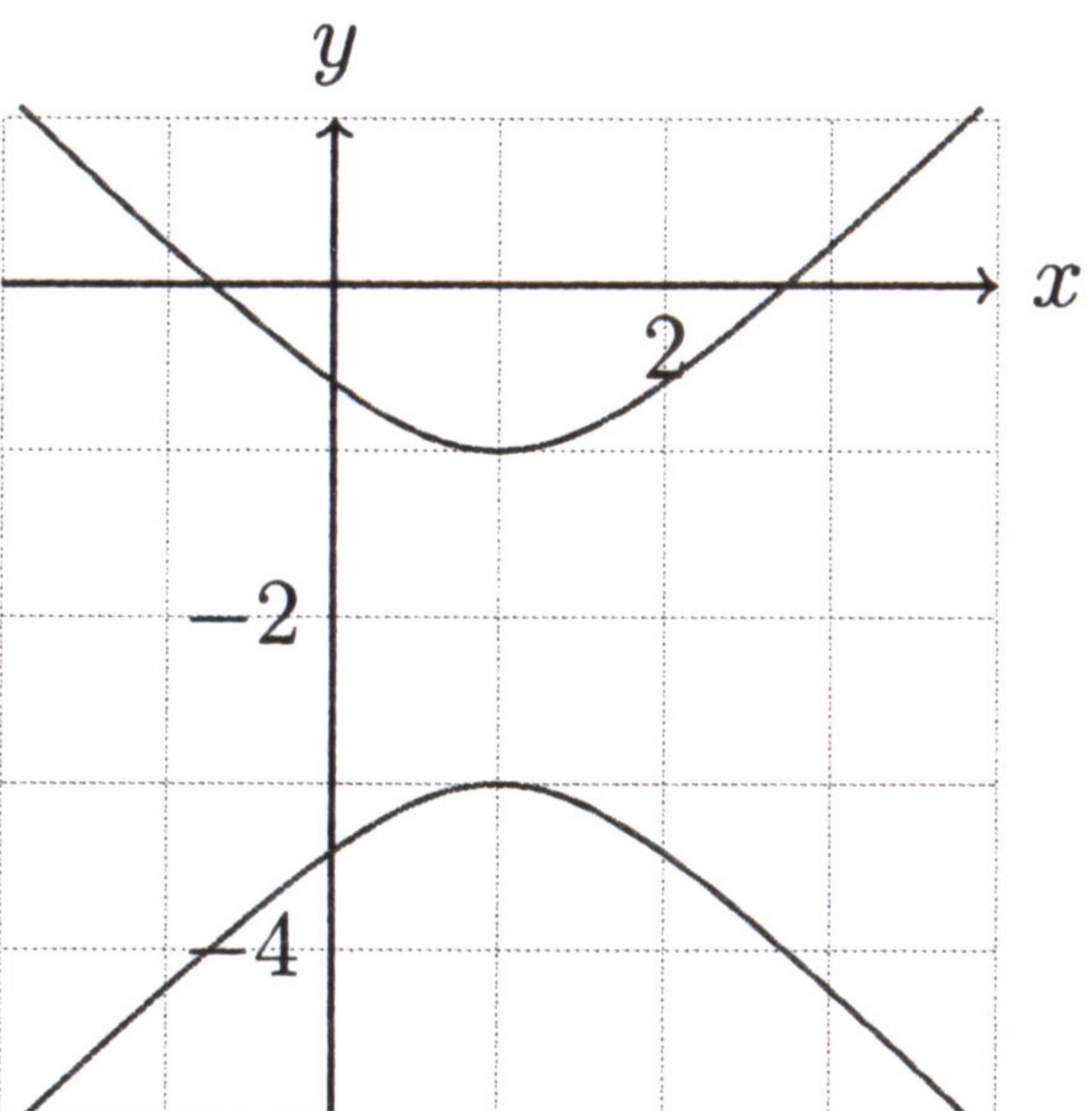
C.



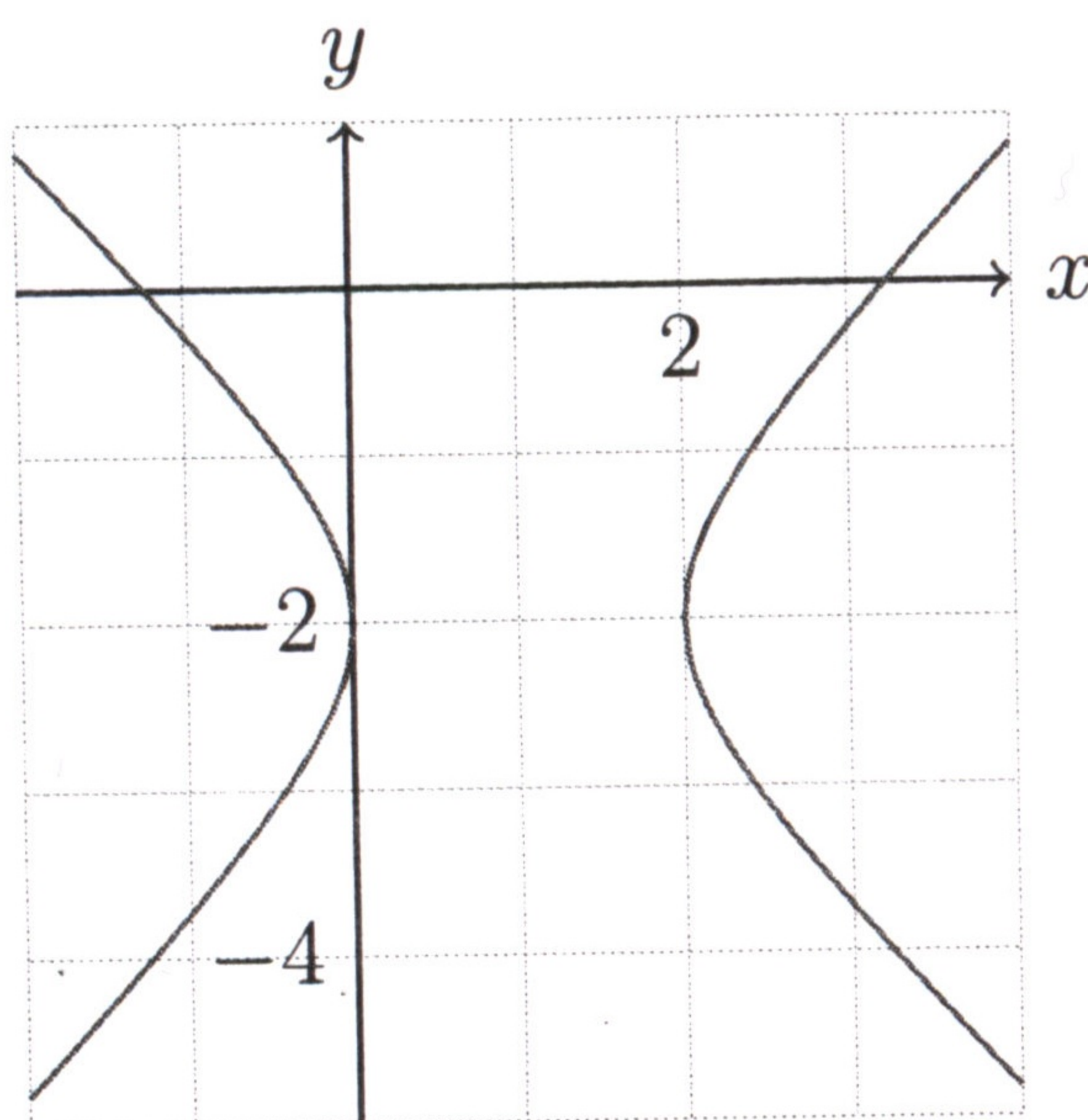
D.



E.



F.



4. Solve the following system of equations for x and y . Find the product $x \cdot y$.

$$\begin{cases} 2x + 3y = 5 \\ 3x - 2y = 14 \end{cases}$$

A. $x \cdot y = -4$

B. $x \cdot y = 4$

C. $x \cdot y = 0$

D. $x \cdot y = 2$

E. $x \cdot y = -2$

5. Solve the following system of equations for y .

$$\begin{cases} x - y = 5 \\ 2x - 3z = 2 \\ 2y + z = 0 \end{cases}$$

A. $y = 3$

B. $y = -3$

C. $y = 1$

D. $y = 2$

E. $y = -1$

F. $y = 0$

G. $y = -2$

6. Solve the system of equations. Find the sum $x + y$.

$$\begin{cases} \frac{4}{x} - \frac{3}{y} = 1 \\ \frac{6}{x} + \frac{3}{y} = 4 \end{cases}$$

- A. 4
- B. 2
- C. 5
- D. 3
- E. 6

7. If $\frac{3x-3}{x^2-9} = \frac{A}{x-3} + \frac{B}{x+3}$, find B .

- A. $B = 3$
- B. $B = 4$
- C. $B = 2$
- D. $B = -1$
- E. $B = -3$
- F. $B = -2$
- G. $B = 1$
- H. $B = -4$

8. If $\frac{3x^2-3x+1}{x^3-2x^2+x} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{(x+1)^2}$, find B .

- A. $B = 4$
- B. $B = -5$
- C. $B = 2$
- D. $B = -2$
- E. $B = -4$
- F. $B = 5$
- G. $B = 3$
- H. $B = -3$

9. How many solutions does the following system of equations have?

$$\begin{cases} x^2 + y^2 + 2x = 3 \\ x^2 - y^2 = 1 \end{cases}$$

- A. 1
- B. 4
- C. 3
- D. 0
- E. 2

10. Solve the following system of equations. Of all solutions, give the largest value of y .

$$\begin{cases} 3x^2 + y^2 = 12 \\ xy = 3 \end{cases}$$

- A. $3\sqrt{3}$
- B. 4
- C. 5
- D. $4\sqrt{3}$
- E. 3

11. Find the fifth term in the sequence $\left\{ \frac{2n+1}{(-1)^n} \right\}$ for $n = 1, 2, 3, \dots$.

- A. 11
- B. 5
- C. -33
- D. 33
- E. -5
- F. -11

12. A sequence $\{a_n\}$ is given by $a_1 = 2$, $a_2 = 3$, and $a_{n+2} = a_{n+1} - a_n$. Find a_6 .

- A. 1
- B. -3
- C. -1
- D. -2
- E. 3
- F. 2

13. Find $\sum_{n=1}^3 n(n+1)$.
- A. 20
B. 6
C. 2
D. 12
E. 19
14. Find the 401st term of the arithmetic sequence whose first term is 20 and whose third term is 10.
- A. -1,985
B. 2,020
C. -2,000
D. -1,995
E. -1,990
F. -1,980
15. Find the arithmetic sum $1 + 6 + 11 + \cdots + 996$.
- A. 1,000,005
B. 498,500
C. 199,400
D. 99,700
E. 100,605
16. Write $0.\overline{36}$ as a fraction $\frac{p}{q}$ in simplest form. What is the value of the numerator p ?
- A. 16
B. 36
C. 4
D. 12
E. 18
17. Find the geometric sum $2 + 2^2 + 2^3 + \cdots + 2^{100}$.
- A. $\frac{2^{101} - 1}{2}$
B. 2^{101}
C. 2^{102}
D. $2(2^{100} - 1)$
E. $2^{100} - 1$
F. $\frac{2^{100} - 1}{2}$

18. Assume $1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$ for all positive integers n . Then $1^3 + 2^3 + 3^3 + \cdots + n^3 + (n+1)^3 + (n+2)^3$ is equal to what expression?

A. $\frac{(n-1)^2(n+1)^2}{4}$

B. $\frac{n^2(n+2)^2}{4}$

C. $\frac{(n+2)^2(n+3)^2}{4}$

D. $\frac{(n^2)(n+2)^2}{4}$

E. $\frac{(n+1)^2(n+2)^2}{4}$

19. Let $A = \{1, 2, 3, 4, 8, 9\}$, $B = \{1, 2, 4, 5, 9\}$, and $C = \{0, 2, 3, 6, 7, 8, 9\}$. Find the number of elements in $(A \cup B) \cap C$.

A. 2

B. 5

C. 4

D. 3

E. 6

F. 7

20. Let $n(C)$ equal the number of elements in a finite set C . If $n(A \cap B) = 7$, $n(A \cup B) = 21$, and $n(B) = 15$, find $n(A)$.

A. 12

B. 13

C. 11

D. 14

E. 6