

1. Find the formula for the composite function $(f \circ g)(x)$ where $f(x) = \frac{2}{x-2}$ and $g(x) = \frac{2}{x+2}$.

A. $\frac{x+2}{x+1}$

B. $-\frac{x+2}{x+1}$

C. $\frac{4}{x^2-4}$

D. $\frac{x+2}{x-2}$

E. $-\frac{x+1}{x+2}$

2. Find the domain of the composite function $(f \circ g)(x)$ if $f(x) = \ln(9-x)$ and $g(x) = x^2$.

A. $\{x \mid -3 \leq x \leq 3\}$

B. $\{x \mid -3 < x < 3\}$

C. $\{x \mid x \geq 3 \text{ or } x \leq -3\}$

D. $\{x \mid x \geq -3\}$

E. $\{x \mid x \leq 3\}$

3. Find the inverse function $f^{-1}(x)$ if $f(x) = \frac{3x+1}{2x-1}$, $x \neq \frac{1}{2}$.

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

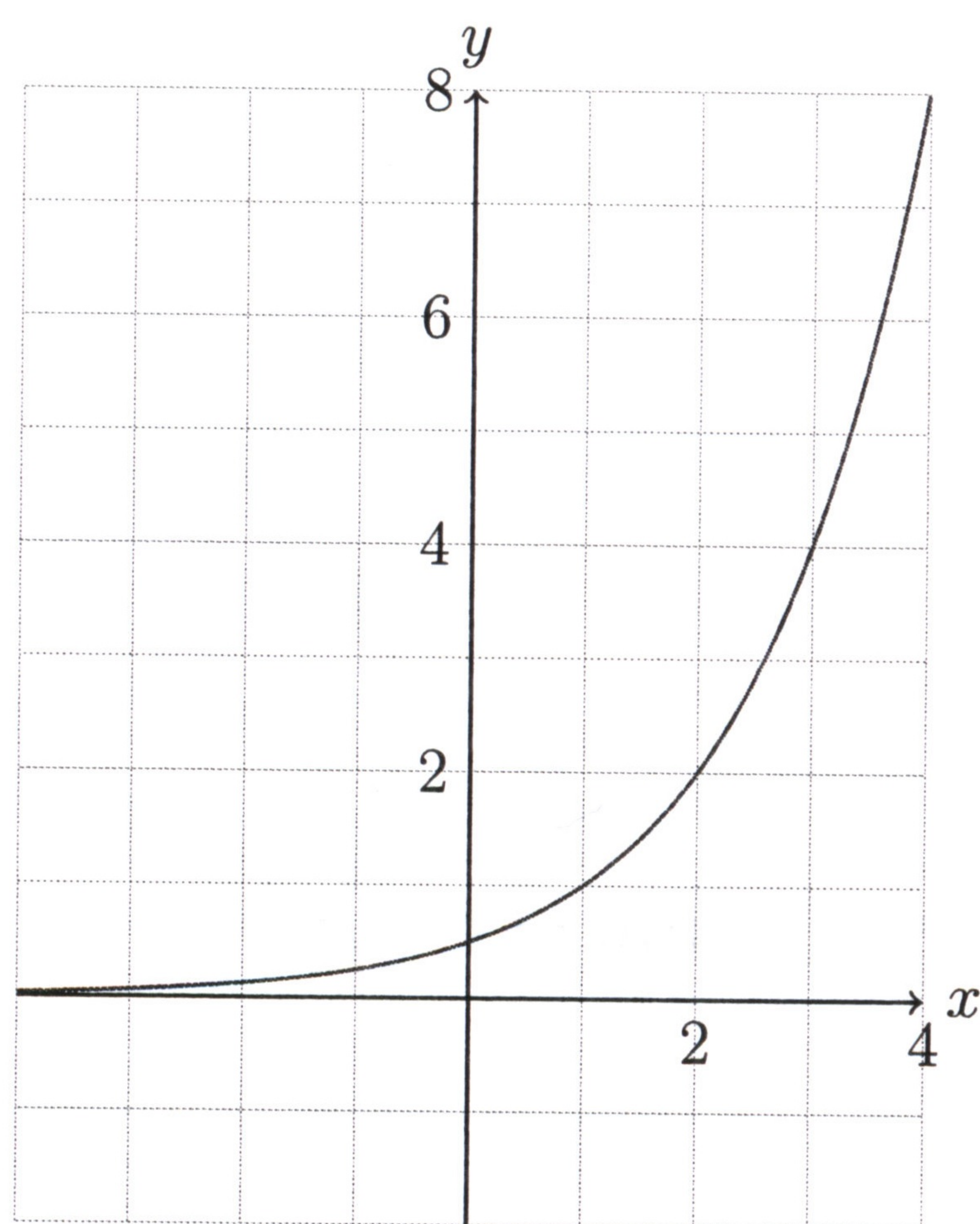
B. $f^{-1}(x) = \frac{x+1}{2x-3}$, $x \neq \frac{3}{2}$

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

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

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

4. Select the function that best describes the given graph.



A. $f(x) = \log_2 x$

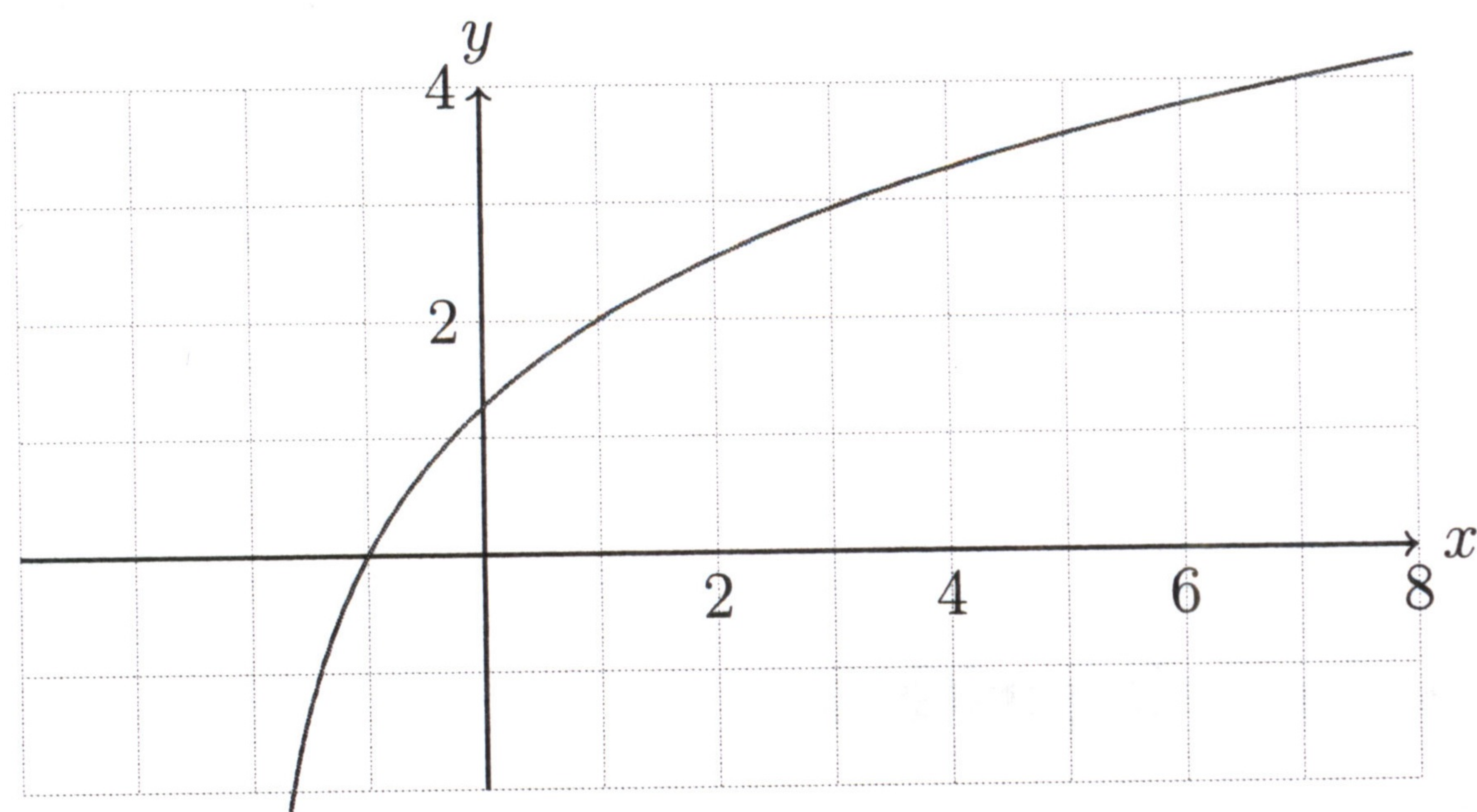
B. $f(x) = 2^x$

C. $f(x) = 2^{x-1}$

D. $f(x) = \log_2(x-1)$

E. $f(x) = 2^{x+1}$

5. Select the function that best describes the given graph.



- A. $f(x) = 2^{x+2}$
B. $f(x) = \log_3(x+2)^2$
C. $f(x) = 2^x$
D. $f(x) = \log_2(x+1)^2$
E. $f(x) = \log_3 x^2$
6. The equation $e^x e^{x^2} = e^{12}$ has two solutions. Find the sum of the two solutions.
A. -1
B. 0
C. 3
D. 1
E. 2
7. Use properties of logarithms to find the exact value of the expression $\log_3 5 \log_5 3$.
A. 2
B. 5
C. 4
D. 1
E. 3
8. Find all solutions to the equation $\log_3(x^2 - x + 3) = 2$.
A. $x = -2$
B. $x = 2$
C. $x = 3$
D. $x = -3, 2$
E. $x = -3$
F. $x = 3, -2$

9. Solve the equation $\ln(x - 6) - \ln(x - 1) = \ln(x - 4) - \ln(x + 2)$.
- A. $x = 14$
 - B. $x = -13$
 - C. $x = 12$
 - D. $x = 16$
 - E. $x = 15$
10. Write the expression $2\ln 9 + 2\ln 25 - 3\ln 5 - 2\ln 3$ as a single logarithm.
- A. $\ln 5$
 - B. $\ln 30$
 - C. $\ln 15$
 - D. $\ln 45$
 - E. $\ln 9$
 - F. $\ln 90$
11. Solve the equation $2e^{2x} + e^x - 1 = 0$ for x .
- A. $x = 1/2$ or -1
 - B. $x = -\ln 2$
 - C. $x = -\ln 2$ or $\ln 2$
 - D. $x = \ln 2$
 - E. $x = \ln 2$ or 0
12. Solve the equation $e^x - 2e^{-x} = 1$ for x .
- A. $x = 1$
 - B. $x = 2$
 - C. $x = 0$
 - D. $x = -1$ or 2
 - E. $x = \ln 2$
13. If $\log_a x = 1$, $\log_a y = 4/3$, and $\log_a z = 3$, find $\log_a \left(\frac{x\sqrt{x}(y^3)}{z\sqrt{z}} \right)$.
- A. -1
 - B. 0
 - C. -2
 - D. 2
 - E. 1

14. Estimate $\log_3 55$.

- A. $5 < \log_3 55 < 6$
- B. $0 < \log_3 55 < 1$
- C. $2 < \log_3 55 < 3$
- D. $4 < \log_3 55 < 5$
- E. $1 < \log_3 55 < 2$
- F. $3 < \log_3 55 < 4$

15. If \$500 is invested at a rate of 8% interest compounded quarterly, find the amount in dollars after 5 years.

- A. $500(1.32)^5$
- B. $500(1.02)^5$
- C. $500(1.02)^{20}$
- D. $500(1.08)^{20}$
- E. $500(1.08)^5$

16. How many years would it take an amount of money to quadruple if it is invested at a rate of 20% compounded continuously?

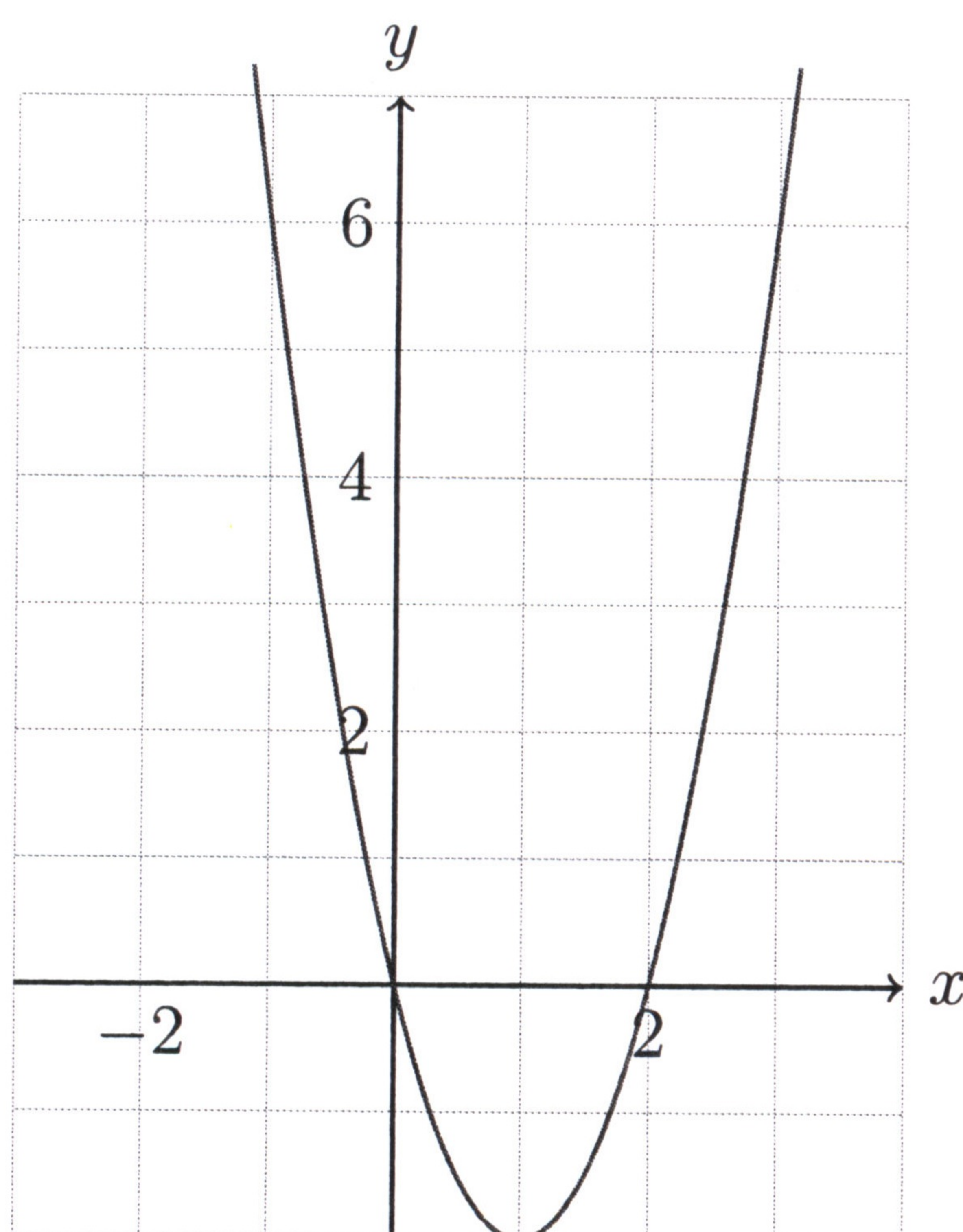
- A. $10\ln 4$
- B. $4\ln 4$
- C. $5\ln 4$
- D. $4\ln 20$
- E. $5\ln 5$
- F. $4\ln 5$

17. A certain amount of radioactive material decays according to the function $A(t) = A_0 e^{-0.1t}$ where t is the time measured in hours, and A_0 is the amount of material at time $t = 0$. What is the half-life of the material in hours?

- A. $10\ln 2$
- B. $2\ln 2$
- C. $20\ln 2$
- D. $\ln 2$
- E. $5\ln 2$

18. Find the y -coordinate for the vertex of the parabola given by the equation $y = -3x^2 + 12x - 14$.
- A. 1
 - B. -3
 - C. 3
 - D. 2
 - E. 0
 - F. -2
 - G. -1

19. Write an equation for the parabola.



- A. $x^2 + 2x$
 - B. $2x^2 + 3x$
 - C. $2x^2 + 4x$
 - D. $x^2 - 2x$
 - E. $2x^2 - 4x$
20. Find the equation for a parabola in the xy -plane with directrix $y = -1/4$ and focus $(1, 1/4)$. Solve for y .
- A. $y = \frac{x^2 - 2x + 1}{4}$
 - B. $y = x^2 + 2x + 1$
 - C. $y = \frac{x^2 + 2x + 1}{4}$
 - D. $y = x^2 - 2x + 1$
 - E. $y = \frac{x^2 - 2x + 1}{2}$