

1. A bank offers a savings certificate where 4.5% interest is compounded quarterly. How much money should be invested so that after 5 years the balance will be \$10,000?

A. \$6,392.32
B. \$7,563.44
C. \$7,995.20
D. \$8,352.70
E. \$8,988.76

2. Which of the following functions would represent a polynomial of degree three with the properties

- (a) zeros at $x = -2, x = 3$
(b) $f(x) > 0$ on the interval $(3, \infty)$

A. $f(x) = x(x + 2)(x - 3)$
B. $f(x) = (x + 2)^2(x - 3)$
C. $f(x) = (x + 2)(x - 3)^2$
D. $f(x) = (x - 2)^2(x - 3)$
E. $f(x) = (x - 2)(x + 3)^2$

3. Approximate x to four decimal places: $\ln x = 1.543$

A. 0.4337
B. 0.1184
C. 34.9140
D. 4.6786
E. None of the above

4. Which of the given functions is a rational function with the following properties.

- (a) zeros at $x = -2, x = 5$
- (b) horizontal asymptote at $y = 2$
- (c) vertical asymptote at $x = 1$
- (d) hole at $x = 3$

A. $f(x) = \frac{2(x+2)(x-5)(x-3)}{(x-1)(x-3)}$

B. $f(x) = \frac{2(x-2)(x+5)(x+3)}{(x+1)(x+3)}$

C. $f(x) = \frac{2(x-1)(x-3)}{(x+2)(x-5)(x-3)}$

D. $f(x) = \frac{2(x+1)(x-3)}{(x-2)(x-5)(x-3)}$

E. $f(x) = \frac{2(x+2)(x-5)(x-3)}{(x-1)^2(x-3)}$

5. If $f(x) = \frac{2x+3}{5x-7}$, find $f^{-1}(x)$.

A. $f^{-1}(x) = \frac{7x+3}{5x-2}$

B. $f^{-1}(x) = \frac{5x-7}{2x+3}$

C. $f^{-1}(x) = \frac{5x+3}{2x-7}$

D. $f^{-1}(x) = \frac{-2x-3}{7-5x}$

E. $f^{-1}(x) = \frac{5x-3}{2x+7}$

6. Given $f(x) = \sqrt{5-x}$ and $g(x) = \sqrt{x-3}$, find the domain of $(f \circ g)(x)$.

A. $(-\infty, 5] \cup [3, \infty)$

B. $[3, 28]$

C. $[3, \infty)$

D. $[28, \infty)$

E. None of the above

7. The volume of a conical pile of sand is changing so that the diameter of the base is increasing at a rate of 9 inches per minute and the height is increasing at a rate of 4 inches per minute. Express the volume V of the sand as a function of time, t .

- A. $V(t) = 12\pi t^3$
- B. $V(t) = 27\pi t^3$
- C. $V(t) = 48\pi t^3$
- D. $V(t) = 108\pi t^3$
- E. None of the above

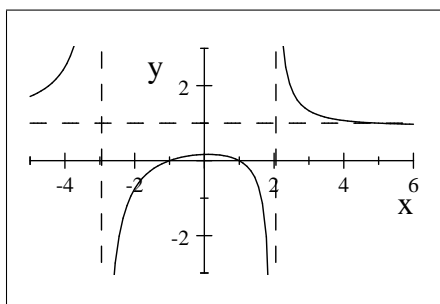
8. Find the quotient, $q(x)$, and remainder, $r(x)$, when $f(x) = 18x^4 + 9x^3 + 3x^2$ is divided by $p(x) = 3x^2 + 1$.

- A. $q(x) = 6x^2 + 3x - 1$; $r(x) = -3x + 1$
- B. $q(x) = 6x^2 + x + 1$; $r(x) = -x$
- C. $q(x) = 6x^2 + 3x + 2$; $r(x) = 6x + 2$
- D. $q(x) = 6x^2 + 3x + 3$; $r(x) = 3x - 3$
- E. $q(x) = 6x^2 - 3x + 3$; $r(x) = 6x - 3$

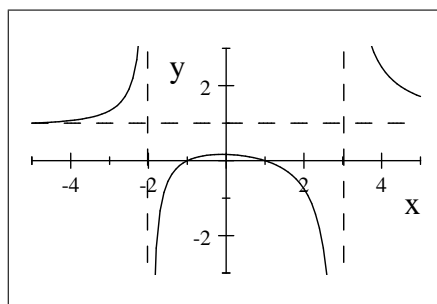
9. Solve for x : $4^{x-3} = \left(\frac{1}{32}\right)^{2x}$

- A. $\frac{3}{10}$
- B. $\frac{3}{5}$
- C. $\frac{1}{4}$
- D. $\frac{1}{2}$
- E. No solution

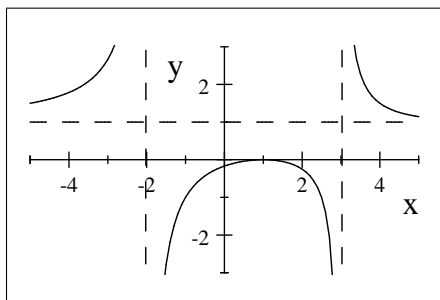
10. Which of the following could be the graph of the function $f(x) = \frac{x^2 - 1}{x^2 - x - 6}$



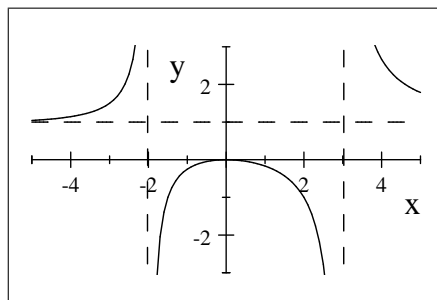
A



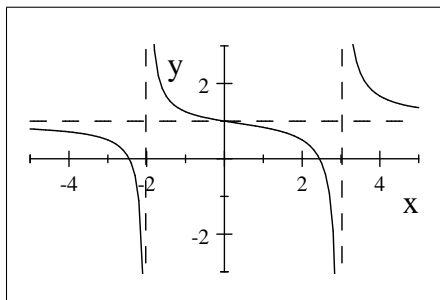
B



C



D



E

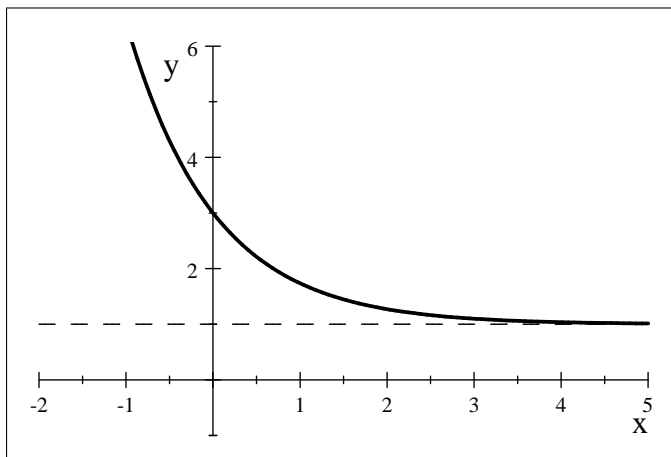
11. Given $f(x) = \frac{\sqrt{x+2}}{x}$, find the range of $f^{-1}(x)$.

- A. $(-\infty, \infty)$
- B. $(-2, \infty)$
- C. $(0, \infty)$
- D. $(-2, 0) \cup (0, \infty)$
- E. None of the above

12. Solve for x : $\log_5(4x) - \log_5(x+1) = \frac{1}{2} \log_5 4$

- A. $\frac{1}{2}$
- B. 1
- C. $\frac{3}{2}$
- D. 2
- E. None of the above

13. The graph shown below could represent which of the following functions?



- A. $f(x) = 2e^x + 1$
 B. $f(x) = 3e^{-x} + 1$
 C. $f(x) = -3e^{-x} + 1$
 D. $f(x) = 2e^{-x} + 1$
 E. $f(x) = -3e^x + 1$
14. The population of a certain community has been modeled by $N(t) = N_0 e^{0.0115t}$, where N_0 is the population of the community in 2010, t is the time, in years, and $N(t)$ is the population after t years. Using this model, determine in what year the population will have doubled.

- A. 2036
 B. 2042
 C. 2056
 D. 2065
 E. 2070

15. Write the expression as one logarithm.

$$2 \log_2 x - \frac{1}{2} \log_2 y + 4 \log_2 z - 3$$

- A. $3 \log_2 (x^2 z^4 \sqrt{y})$
 B. $3 \log_2 \left(\frac{x^2 z^4}{\sqrt{y}} \right)$
 C. $3 \log_2 \left(\frac{x^2}{z^4 \sqrt{y}} \right)$
 D. $\log_2 \left(\frac{8x^2 z^4}{\sqrt{y}} \right)$
 E. $\log_2 \left(\frac{x^2 z^4}{8\sqrt{y}} \right)$

1. C
2. B
3. D
4. E
5. A
6. B
7. B
8. A
9. D
10. B
11. E $[-2, 0) \cup (0, \infty)$
12. B
13. D
14. E
15. E