Solve the given equation for y.

1. $\log_5 y = 6$

2. $\log_6 y = 7$

3. $5\log_3 9 = y$

4. $3\log_4 16 = y$

Find the exact value of the expression.

5. $\sin(\pm\pi)$

6. $\cos(\pm\pi)$

7. $\tan(\pm\pi)$

8. $\sec\frac{\pi}{4}$

9. $\csc\frac{\pi}{4}$

10. $\cot\frac{\pi}{4}$

Given $\sin\theta = \frac{12}{13}$ and $\cos\theta < 0$, find the value of the expression.

11. $\cos\theta$

12. $\tan\theta$

Given $\sin\theta = \frac{12}{13}$ and $\cos\theta < 0$, find the value of the expression.

13. $\csc\theta$

Given $\cos\theta = \frac{1}{2}$ and $\sin\theta < 0$, find the value of the expression.

14. $\tan\theta$

15. $\sec\theta$

16. $\csc\theta$

Describe the domain and range of the given function using interval notation.

17. $d: x \to ab^x$, where $a > 0$ and $b > 1$

18. $e: x \to ab^x$, where $a > 0$ and $0 < b < 1$

19. $f: x \to \log_b x$, where $0 < b < 1$

20. $g: x \to \ln x$, where $x > 1$

Use interval notation to describe where the function with the given equation is increasing.

21. $g(x) = x^2 + 1$

22. $f(x) = \tan x$ on the interval $[\pi, 2\pi]$

Use interval notation to describe where the function with the given equation is decreasing.

23. $g(x) = x^2 \pm 4x + 4$

Use interval notation to describe where the function with the given equation is decreasing.

24. $f(x) = \sin x$ on the interval $[0, 2\pi]$

25. Describe the end behavior of f with $f(x) = e^{0.3x}$.

26. Describe the end behavior of f with $f(x) = \log(\pm x)$.

Give the equations for any asymptotes of the graph of the function with the given equation.

27. $f(x) = \pm 4e^{3x}$

28. $f(x) = \pm 3\ln x + 5$

29. $f(x) = \tan x$ for $0 \le x \le \dfrac{3\pi}{2}$

30. $f(x) = \csc x$ for $0 \le x \le \dfrac{3\pi}{2}$

A reservoir is stocked with 5000 bass. Under normal conditions this bass population should increase about 15% each year. Let F_n represent the number of bass in the lake n years after the lake was stocked.

31. Fill in the blank to write a recursive formula for F_n, assuming an unlimited growth model.

$$\begin{cases} F_0 = 5000 \\ F_{n+1} = \underline{\quad ? \quad}, n \ge 0 \end{cases}$$

32. Write an explicit formula for F_n, assuming a continuous unlimited growth model.

33. The maximum number of bass that can survive in the lake is 50,000. Using the limited growth model difference equation $F_{n+1} = F_n + 0.2F_n\left(1 - \dfrac{F_n}{50000}\right)$, what is the end behavior of this sequence? Why is this a better model than an unlimited growth model?

The average rate of growth of metropolitan areas in the United States is currently approximately 14%. In the year 2000, about 226 million people lived in U.S. metropolitan areas. Let F_n represent the number of people, in millions, in metropolitan areas n years after 2000.

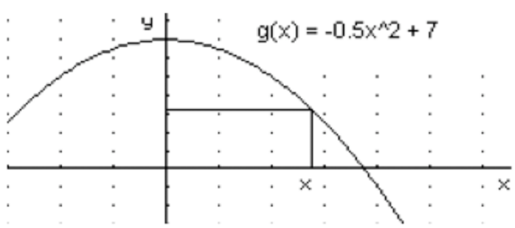
34. Fill in the blank to write a recursive formula for F_n, assuming an unlimited growth model.

$$\begin{cases} F_0 = 226 \\ F_{n+1} = \underline{\quad ? \quad},\, n \geq 0 \end{cases}$$

35. Write an explicit formula for F_n, assuming a continuous unlimited growth model.

36. Assume that eventually the maximum urban population will be about 61 billion people. Using the limited growth model difference equation $F_{n+1} = F_n + 0.2F_n\left(1 - \frac{F_n}{61{,}000}\right)$, what is the end behavior of this sequence? Why is this a better model than the unlimited growth model?

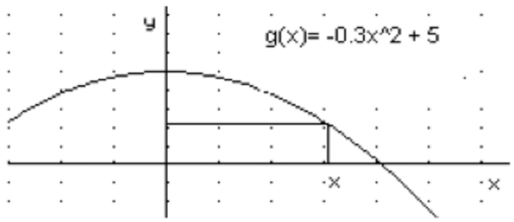
A rectangle is drawn with one corner at the origin and another in the first quadrant on the curve $g(x) = \pm 0.5x^2 + 7$.



37. Let the bottom two vertices of the rectangle be $(0,\ 0)$ and $(x,\ 0)$. Find the coordinates of the two other vertices in terms of x.

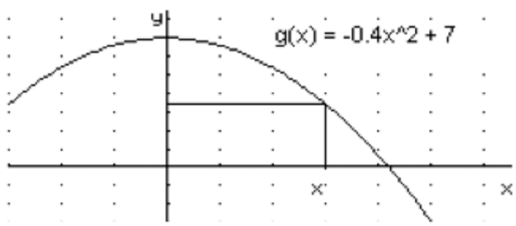
38. Find a formula for the area $A(x)$ of the rectangle in terms of x.

39. A rectangle is drawn with one corner at the origin and another in the first quadrant on the curve $g(x) = \pm 0.3x^2 + 5$.



The area of the rectangle is given by $A(x) = \pm 0.3x^3 + 5x$. Use the function A to find the maximum area of the rectangle.

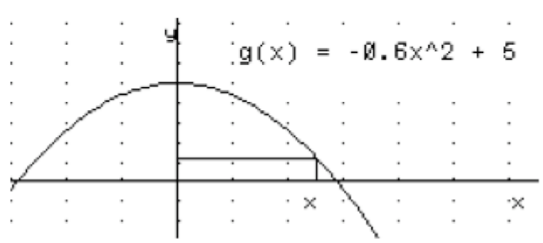
A rectangle is drawn with one corner at the origin and another in the first quadrant on the curve $g(x) = \pm 0.4x^2 + 7$.



40. Let the bottom two vertices of the rectangle be $(0, 0)$ and $(x, 0)$. Find the coordinates of the two other vertices in terms of x.

41. Find a formula for the area $A(x)$ of the rectangle in terms of x.

42. A rectangle is drawn with one corner at the origin and another in the first quadrant on the curve $g(x) = \pm 0.6x^2 + 5$.

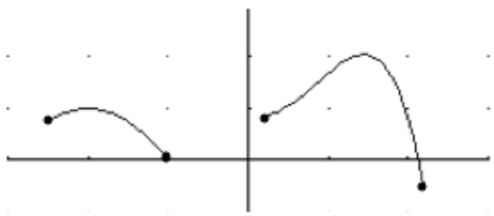


The area of the rectangle is given by $A(x) = \pm 0.6x^3 + 5x$. Use the function A to find the maximum area of the rectangle.

43. Draw a graph of a function that has a horizontal asymptote at $y = 0$, has a local maximum of 2, and is decreasing only on $(1,\ 3)$.

44. Draw a graph of a function that has a horizontal asymptote at $y = 0$, has a local minimum of ± 2, and is increasing only on $(1,\ 3)$.

Consider the graph of the function f as shown.

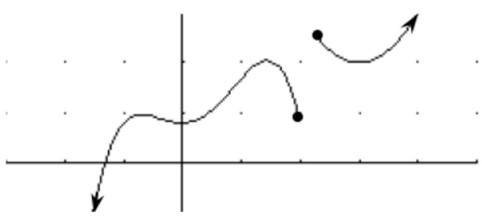


45. Approximate $f(\pm 2)$. What type of point does this appear to be?

46. Approximate all maxima and minima of $f(x)$. Are any of these absolute maxima or minima?

47. Over which intervals is f increasing?

Consider the graph of the function f as shown.



48. Approximate $f(0)$. What type of point does this appear to be?

49. Approximate all maxima and minima of $f(x)$. Are any of these absolute maxima or minima?

50. Over approximately which intervals is f increasing?