1.4 Graphing Calculators and Computers

A Click here for answers.

S Click here for solutions.

1–10 Determine an appropriate viewing rectangle for the given function and use it to draw the graph.

1. $f(x) = 4 + 6x - x^2$

2. $f(x) = 0.2x^2 + 3.5x - 5$

3. $f(x) = \sqrt[4]{256 - x^2}$

4. $f(x) = \sqrt{12x - 17}$

5. $y = \dfrac{1}{x^2 + 25}$

6. $y = \dfrac{x}{x^2 + 25}$

7. $y = x^4 - 4x^3$

8. $y = x^3 + \dfrac{1}{x}$

9. $y = \dfrac{2x - 1}{x + 3}$

10. $y = 2x - |x^2 - 5|$

11–13 Find all solutions of the equation correct to two decimal places.

11. $3x^3 + x^2 + x - 2 = 0$

12. $x^4 + 8x + 16 = 2x^3 + 8x^2$

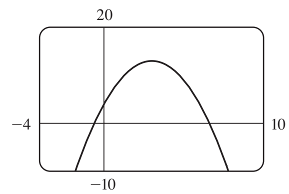
13. $2 \sin x = x$

14. Use graphs to determine which of the functions $f(x) = x^4 - 100x^3$ and $g(x) = x^3$ is eventually larger.

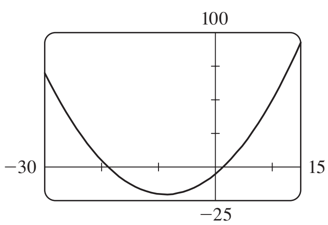
Answers

A Click here for exercises.

1. [−4, 10] by [−10, 20]



2.



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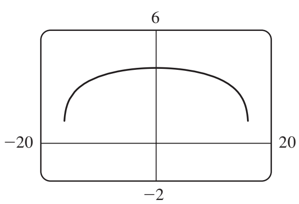

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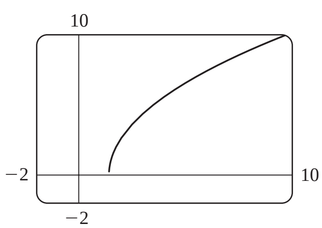

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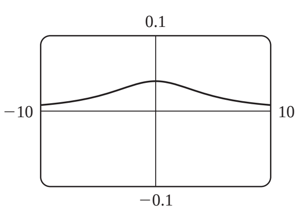

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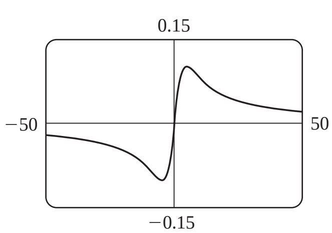
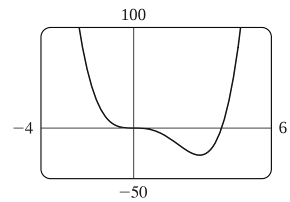


A Click here for solutions.

7.



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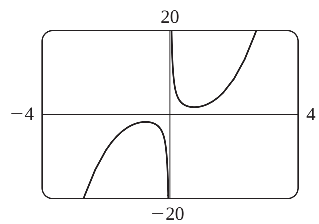

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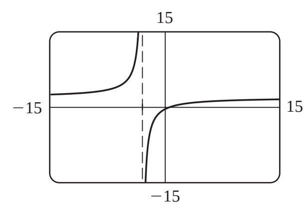
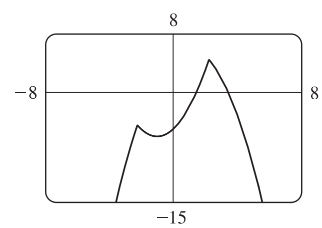


10.



11. 0.67 **12.** −2, −1.24, 2, 3.24

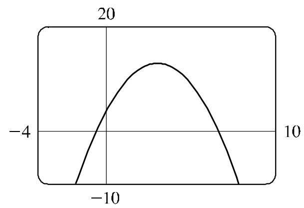
13. −1.90, 0, 1.90 **14.** $f(x)$

Solutions

E Click here for exercises.

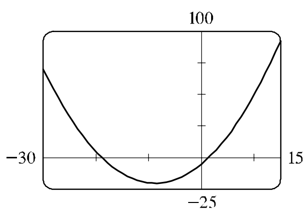
A Click here for answers.

1. $f(x) = 4 + 6x - x^2$

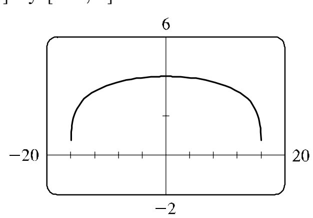


Note that many similar rectangles give equally good views of the function.

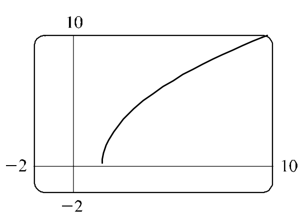
2.



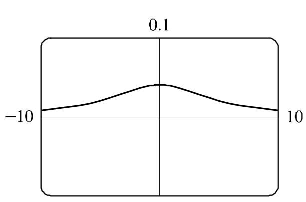
3. $f(x) = \sqrt[4]{256 - x^2}$. To find an appropriate viewing rectangle, we calculate f's domain and range: $256 - x^2 \geq 0$ $\Leftrightarrow$ $x^2 \leq 256$ $\Leftrightarrow$ $|x| \leq 16$ $\Leftrightarrow$ $-16 \leq x \leq 16$, so the domain is $[-16, 16]$. Also, $0 \leq \sqrt[4]{256 - x^2} \leq \sqrt[4]{256} = 4$, so the range is $[0, 4]$. Thus, we choose the viewing rectangle to be $[-20, 20]$ by $[-2, 6]$.



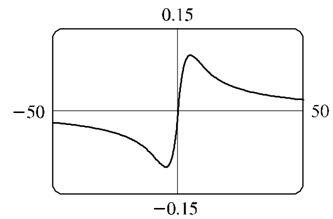
4. $f(x) = \sqrt{12x - 17}$



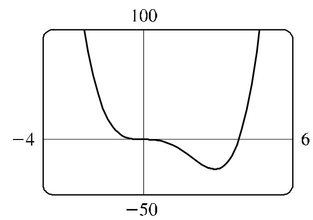
5. $y = \dfrac{1}{x^2 + 25}$



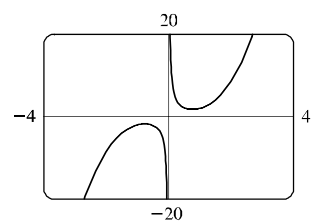
6. $y = \dfrac{x}{x^2 + 25}$



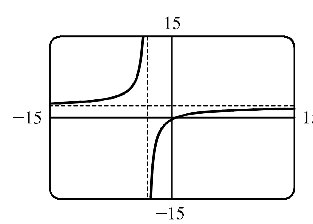
7. $y = x^4 - 4x^3$



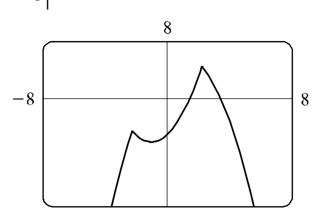
8. $y = x^3 + 1/x$



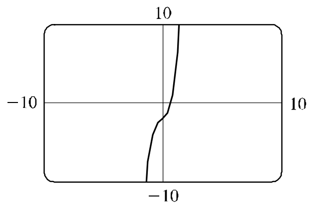
9. $y = \dfrac{2x - 1}{x + 3}$

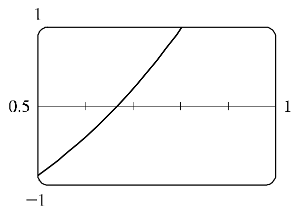


10. $y = 2x - |x^2 - 5|$

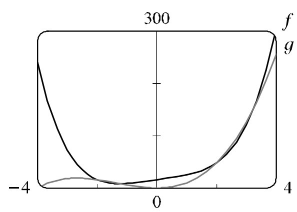


11. Graphing $f(x) = 3x^3 + x^2 + x - 2$ in a standard viewing rectangle, $[-10, 10]$ by $[-10, 10]$, reveals one real root between 0 and 1. The second figure shows a close-up of this region. By using a root finder or by zooming in, we find the value of the root to be approximately 0.67.

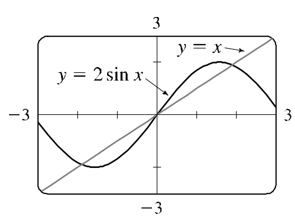


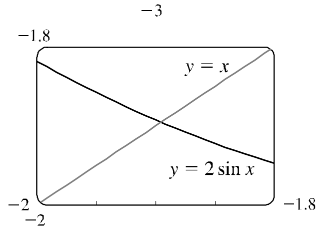


12. Graphing both $f(x) = x^4 + 8x + 16$ and $g(x) = 2x^3 + 8x^2$, it appears that there are four points of intersection (see the figure). We can now use an intersection finder or zoom in on the regions of interest to find the solutions $x \approx -2, -1.24, 2$, and 3.24.



13. From the graph of $f(x) = 2\sin x$ and $g(x) = x$, we see that there are three points of intersection. The intersection point $(0, 0)$ is obvious and due to the symmetry of the graphs (both functions are odd), we only need to find one of the other two points of intersection. Using an intersection finder or zooming in, we find the x-value of the intersection to be approximately 1.90. Hence, the solutions are $x = 0$ and $x \approx \pm 1.90$.





14. $f(x) = x^4 - 100x^3$ is larger than $g(x) = x^3$ whenever $x > 101$.