

Answers

7.

Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
2	1	0	3
0	1	2	3

-2 , $\frac{1}{3}$, and 1

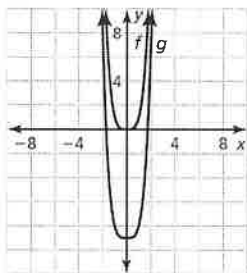
8.

Positive real zeros	Negative real zeros	Imaginary zeros	Total zeros
3	1	0	4
1	1	2	4

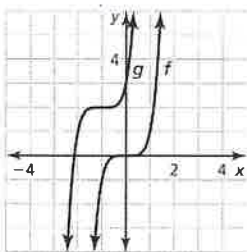
-5 , 2 , $-2i$, and $2i$

4.7 Extra Practice

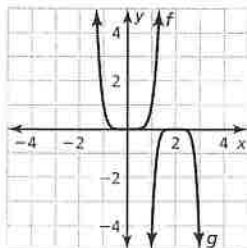
1. The graph of g is a translation 9 units down of the graph of f .



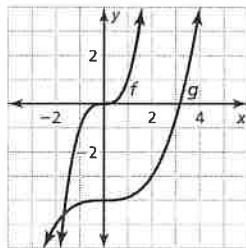
2. The graph of g is a translation 1 unit left and 2 units up of the graph of f .



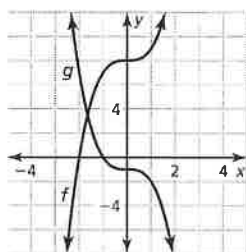
3. The graph of g is a vertical stretch by a factor of 5 and a translation 2 units right, followed by a reflection in the x -axis of the graph of f .



4. The graph of g is a horizontal stretch by a factor of 2, followed by a translation 4 units down of the graph of f .

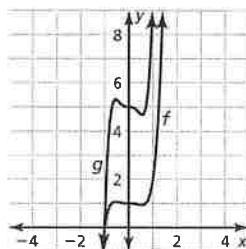


5. $g(x) = -x^3 - 1$



The graph of g is a reflection in the y -axis, followed by a translation 9 units down of the graph of f .

6. $g(x) = 10x^5 - 5x^3 + 5$



The graph of g is a vertical stretch by a factor of 5 of the graph of f .

7. $g(x) = -2(x + 1)^3 + 12(x + 1)^2 - 10$

8. $g(x) = 243x^4 - 27x^3 + 27x^2 + 4$

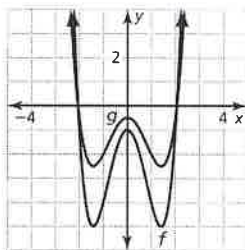
9. $V(x) = 100\pi x^2(x + 6)$; $W(x) = \pi x^2\left(\frac{1}{10}x + 6\right)$;
 $W(2) = 24.8\pi \approx 77.91$; When x is 2 millimeters, the volume of the cylinder is about 77.91 cubic centimeters.

4.7 Review & Refresh

1. The maximum value is 16; The domain is all real numbers and the range is $y \leq 16$. The function is increasing to the left of $x = -1$ and decreasing to the right of $x = -1$.

Answers

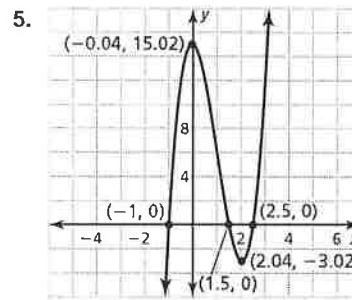
2. $-\frac{4}{5}$, $3 + \sqrt{6}$, and $3 - \sqrt{6}$
3. The model makes sense for $x > 6$; When factored completely, the volume is $V = (x - 5)(x - 6)(2x - 7)$. For all three dimensions of the box to have positive lengths, the value of x must be greater than 6.
4. $y = -3x^2 - 12x + 180$
5. 4; $x = -2$, $x = 2$, $x = i$, and $x = -i$
6. $12 - 4i$ 7. $-80 - 36i$
8. $y > -x^2 + x + 2$
9. $g(x) = \frac{1}{2}x^4 - 2x^2 - \frac{1}{2}$



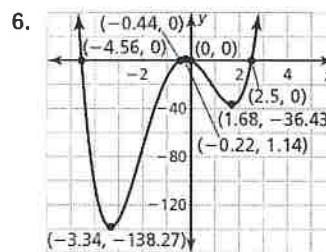
The graph of g is a vertical shrink by a factor of $\frac{1}{2}$ of the graph of f .

4.8 Extra Practice

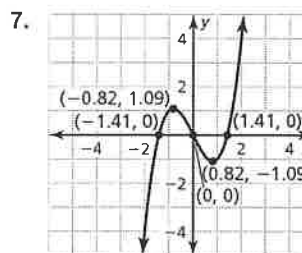
- 1.
- 2.
3. -5 , $-\frac{3}{2}$, and 1 4. -7 and $\frac{1}{3}$



The x -intercepts of the graph are $x = -1$, $x = 1.5$, and $x = 2.5$. The function has a local maximum at about $(-0.04, 15.02)$ and a local minimum at about $(2.04, -3.02)$. The function is increasing when $x < -0.04$ and when $x > 2.04$ and decreasing when $-0.04 < x < 2.04$.

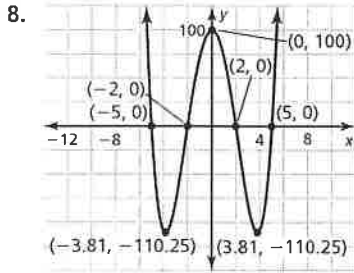


The x -intercepts of the graph are $x = 0$, $x \approx -4.56$, $x \approx -0.44$, and $x = 2.5$. The function has a local maximum at about $(-0.22, 1.14)$ and local minima at about $(-3.34, -138.27)$ and about $(1.68, -36.43)$; The function is increasing when $x > 1.68$ and when $-3.34 < x < -0.22$, and decreasing when $x < -3.34$ and $-0.22 < x < 1.68$.



The x -intercepts of the graph are $x \approx -1.41$, $x = 0$, and $x \approx 1.41$. The function has a local maximum at about $(-0.82, 1.09)$ and a local minimum at about $(0.82, -1.09)$; The function is increasing when $x < -0.82$ and when $x > 0.82$, and decreasing when $-0.82 < x < 0.82$.

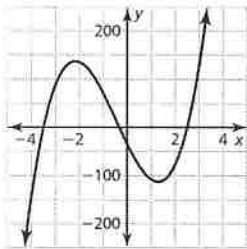
Answers



The x -intercepts of the graph are $x = -5$, $x = -2$, $x = 2$, and $x = 5$. The function has a local maximum at $(0, 100)$ and local minima at about $(-3.81, -110.25)$ and about $(3.81, -110.25)$; The function is increasing when $-3.81 < x < 0$ and when $x > 3.81$ and decreasing when $x < -3.81$ and $0 < x < 3.81$.

9. *Sample answer:*

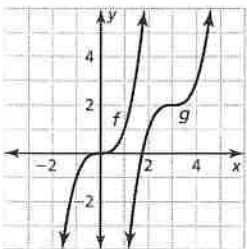
$$f(x) = 12x^3 + 16x^2 - 101x - 35$$



no; The function could have repeated zeros or infinitely many imaginary zeros.

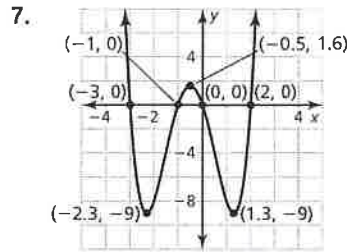
4.8 Review & Refresh

- quadratic; The second differences are constant.
- 22.25 ft
 - 2.25 sec
- The graph of g is a translation 3 units right and 2 units up of the graph of f .



4. $3x + 4 + \frac{12}{x - 5}$

5. $-3, 2, -2i$, and $2i$ 6. $x = -2$ and $x = -1$



The x -intercepts are $x = -3$, $x = -1$, $x = 0$, and $x = 2$. The function has local maximums at about $(-0.5, 1.6)$ and local minimums at about $(-2.3, -9)$ and about $(1.3, -9)$; The function is increasing when $-2.3 < x < -0.5$ and when $x > 1.3$ and decreasing when $x < -2.3$ and $-0.5 < x < 1.3$.

8. $25z^2 - 49$

4.9 Extra Practice

- $f(x) = \frac{1}{2}(x + 2)(x - 1)(x - 3)$
- $f(x) = \frac{1}{3}(x + 4)(x - 1)(x - 2)$
- $f(x) = (x + 5)(x + 6)(x - 4)$
- $f(x) = 2(x - 3)(x - 6)(x + 1)$
- 2; $f(x) = -\frac{1}{2}x^2 + 6x$
- 3; $f(x) = -3x^3 + 2x^2 + x$
- 3; $f(x) = x^3 - x^2 - 2x$
- 4; $f(x) = x^4 - x^3 + 10$
- $y = x^3 + 5$; 13,000 bacteria
- $y = 2x^4 - 2x + 6$; 2017

4.9 Review & Refresh

- The degree is 5, and the leading coefficient is negative.
- $g(x) = -(x - 7)^2 - 2$
- $(-1, 5)$ and $(2, -4)$; Explanations will vary.
- $f(x) = x(x + 1)(x - 3)$