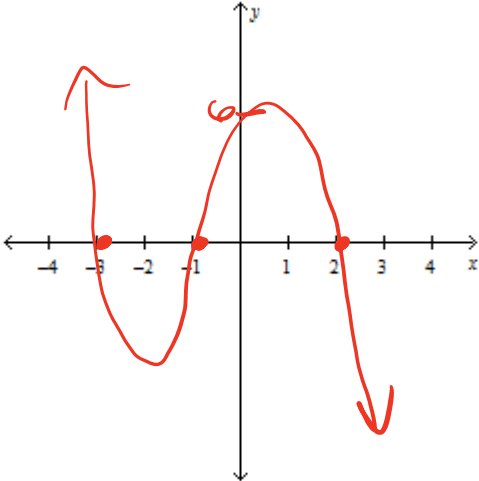
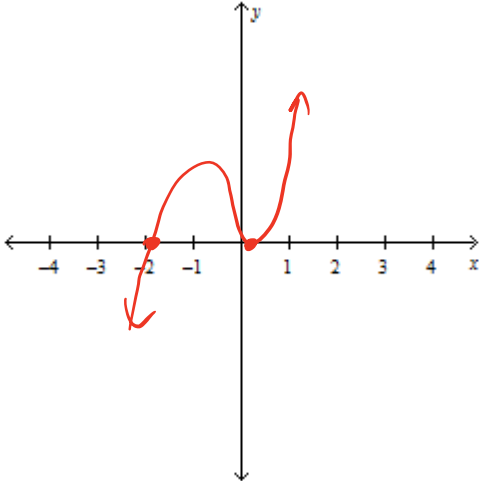


Homework 3.6

In exercises 1 – 6, identify the given characteristics of the function given in algebraic form.

<p>$f(x) = -(x+3)(x+1)(x-2)$ $f(x) = -x^3 + \dots + 6$</p> <p>1. Identify the zeros of $f(x)$ and their multiplicities. $x = -3, -1, 2$ each have mult of 1</p>	<p>$g(x) = x^2(x+2)$ $g(x) = x^3 + 2x^2 + 0$</p> <p>4. Identify the zeros of $g(x)$ and their multiplicities. $x = 0$ has mult of 2 $x = -2$ has mult of 1</p>
<p>2. Identify the end behavior of $f(x)$ and give a reason for your answer. B/c $f(x)$ has ODD degree and lead coefficient is negative, $\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = \infty$</p>	<p>5. Identify the end behavior of $g(x)$ and give a reason for your answer. B/c $g(x)$ is ODD degree and lead coefficient is positive ... $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$</p>
<p>3. Sketch a possible graph of $f(x)$ based on the zeros, their multiplicities, and the end behavior that you identified.</p> 	<p>6. Sketch a possible graph of $g(x)$ based on the zeros, their multiplicities, and the end behavior that you identified.</p> 

Given the function $h(x) = -x^3 + 4x^2 + 5x$, answer the following questions 7 – 9.

7. Determine the left and right end behavior. Justify your answer.

$\lim_{x \rightarrow \infty} h(x) = -\infty$
 $\lim_{x \rightarrow -\infty} h(x) = \infty$

b/c $h(x)$ is ODD degree and negative lead coefficient

8. Completely factor $h(x)$ and state the zeros and their multiplicities.

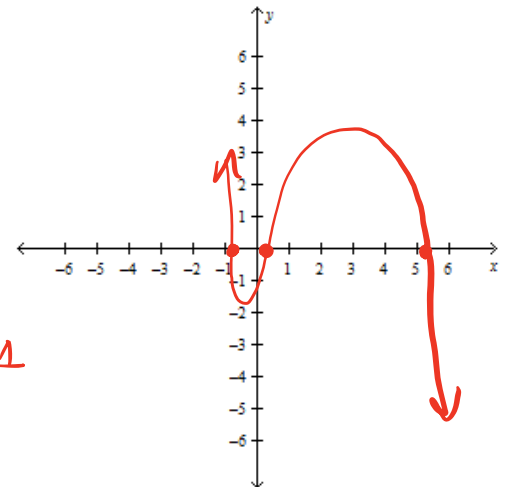
$h(x) = -x(x^2 - 4x - 5)$
 $h(x) = -x(x-5)(x+1)$

zeros of $h(x)$ are $x = -1, 0$ and 5 each with multiplicity of 1

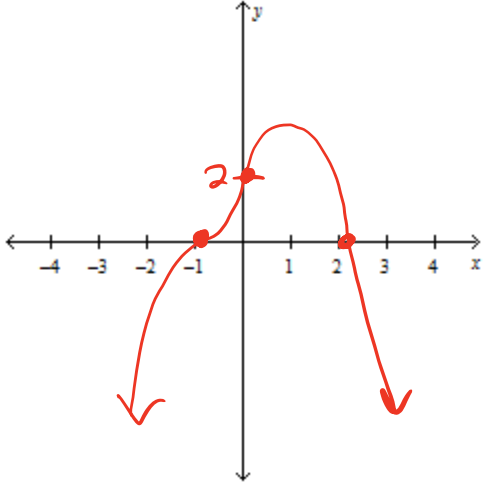
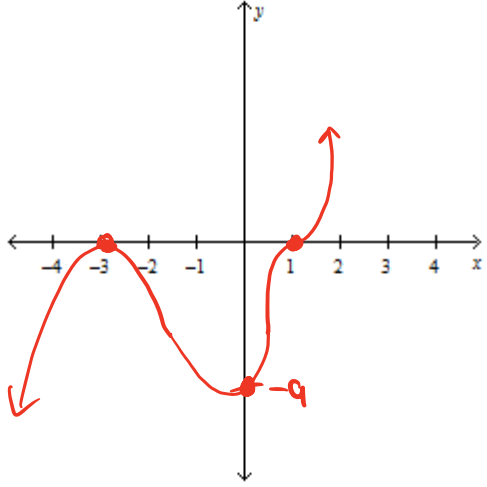
$0 = -x$ } $0 = x - 5$ } $0 = x + 1$
 $0 = x$ } $5 = x$ } $-1 = x$

9. Sketch the graph of $h(x)$ on the axes to the right.

TO RIGHT



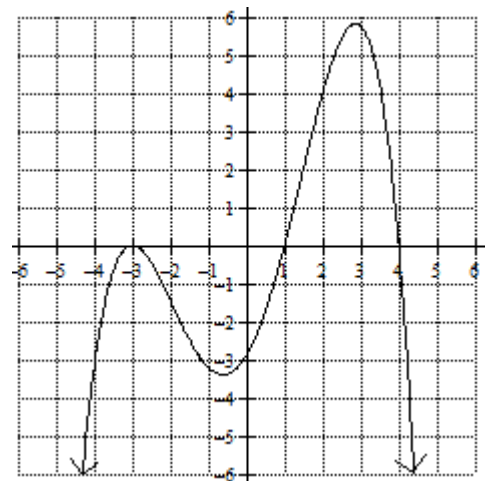
In exercises 10 – 15, identify the given characteristics of the function given in algebraic form.

$f(x) = -(x+1)^3(x-2)$ $= -x^4 + \dots + 2$	$g(x) = (x+3)^2(x-1)^3$ $= x^5 + \dots - 9$
<p>10. Identify the zeros of $f(x)$ and their multiplicities.</p> <p>$x = -1$ mult 3 $x = 2$ mult 1</p>	<p>13. Identify the zeros of $g(x)$ and their multiplicities.</p> <p>$x = -3$ mult 2 $x = 1$ mult 3</p>
<p>11. Identify the end behavior of $f(x)$ and give a reason for your answer.</p> <p>$f(x)$ is even with lead coefficient negative</p> <p>$\therefore \lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$</p>	<p>14. Identify the end behavior of $g(x)$ and give a reason for your answer.</p> <p>$f(x)$ is odd with lead coefficient positive</p> <p>$\therefore \lim_{x \rightarrow -\infty} f(x) = -\infty$ $\lim_{x \rightarrow \infty} f(x) = \infty$</p>
<p>12. Sketch a possible graph of $f(x)$ based on the zeros, their multiplicities, and the end behavior that you identified.</p> 	<p>15. Sketch a possible graph of $f(x)$ based on the zeros, their multiplicities, and the end behavior that you identified.</p> 

Use the graph of the function, $f(x)$, pictured to the right to answer questions 16 – 17.

16. What type of function is $f(x)$? Explain your reasoning.

- $x = -3$ has Even mult ≥ 2 b/c $f(x)$ is tangent to x-axis at $x = -3$.
 - $x = 1$ and $x = 4$ each have odd mult of 1 b/c $f(x)$ crosses the x-axis at $x = 1$ and $x = 4$ w/o changing concavity.
 - The sum of the zeros mult is even ≥ 4
- $\therefore f(x)$ has even degree ≥ 4



17. Would the leading coefficient of the equation of $f(x)$ be positive or negative? Explain your reasoning.

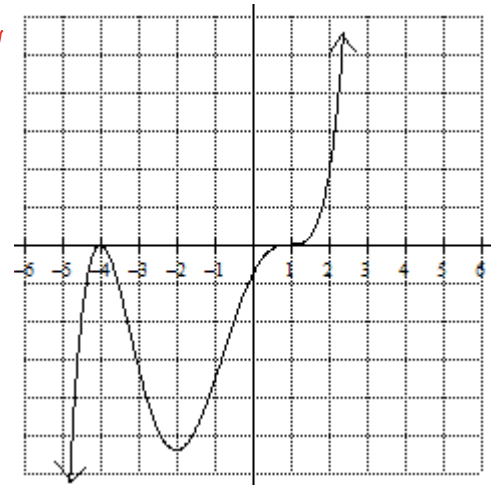
$f(x)$ falls on right

$\therefore f(x)$ has lead coefficient negative

Use the graph of the function, $f(x)$, pictured to the right to answer questions 18 – 19.

18. What type of function is $f(x)$? Explain your reasoning.

- $x = -4$ has even multiplicity ≥ 2 b/c $f(x)$ is tangent to x -axis at $x = -4$
 - $x = 1$ has odd multiplicity ≥ 3 b/c $f(x)$ crosses x -axis and changes concavity at $x = 1$.
 - The sum of the zeros multiplicities is odd ≥ 5 .
- $\therefore f(x)$ is odd degree ≥ 5



19. Would the leading coefficient of the equation of $f(x)$ be positive or negative? Explain your reasoning.

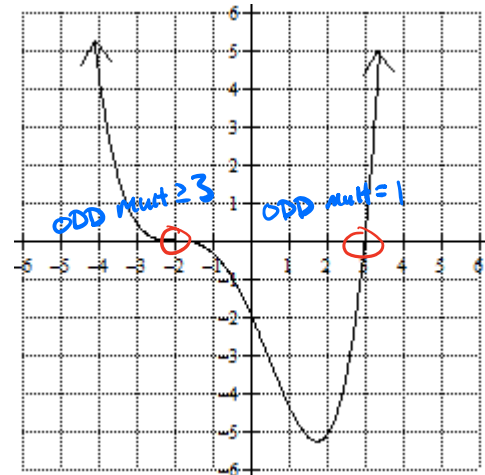
$f(x)$ rises to right.

\therefore The lead coefficient of $f(x)$ is positive.

Use the graph of the function, $f(x)$, pictured to the right to answer questions 20 – 21.

20. What type of function is $f(x)$? Explain your reasoning.

- $x = -2$ is odd multiplicity ≥ 3 b/c $f(x)$ crosses the x -axis and changes concavity at $x = -2$
 - $x = 3$ is odd multiplicity = 1 b/c $f(x)$ crosses the x -axis and doesn't change concavity at $x = 3$
 - The sum of the zeros multiplicities is even ≥ 4
- $\therefore f(x)$ is even degree ≥ 4



21. Would the leading coefficient of the equation of $f(x)$ be positive or negative? Explain your reasoning.

$f(x)$ rises on right

$\therefore f(x)$'s lead coefficient is positive.