

LESSON 3.4 Skills Practice

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Polynomial DNA
Key Characteristics of Polynomial Functions**Vocabulary**

Define each term in your own words.

1. absolute maximum
2. absolute minimum
3. extrema

3**Problem Set**

List the number of possible extrema for each polynomial.

1. 3rd degree polynomial
A 3rd degree polynomial can have 0 or 2 extrema.
2. 4th degree polynomial
3. 8th degree polynomial
4. 15th degree polynomial
5. 20th degree polynomial
6. 37th degree polynomial

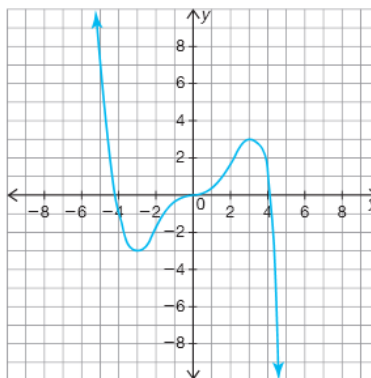
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Use the coordinate plane to sketch a graph with the given characteristics. If the graph is not possible to sketch, explain why.

7. Characteristics:

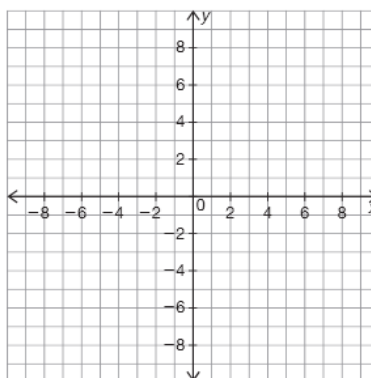
- degree 5
- starts in quadrant I
- ends in quadrant IV
- relative maximum at $x = 3$
- relative minimum at $x = -3$



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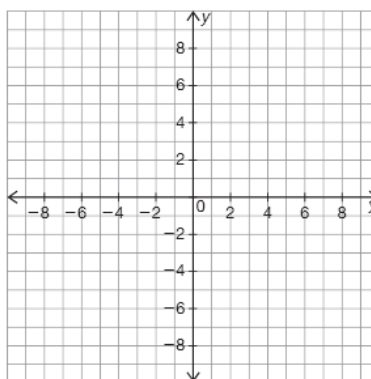
8. Characteristics:

- even degree
- increases to $x = -2$, then decreases to $x = 0$, then increases to $x = 2$, then decreases
- relative minimum at $y = 1$
- two absolute maximums at $y = 4$



9. Characteristics:

- degree 3
- negative a-value
- y-intercept at $y = -4$
- x-intercepts at $x = -5$, $x = -2$, $x = 1$, and $x = 3$



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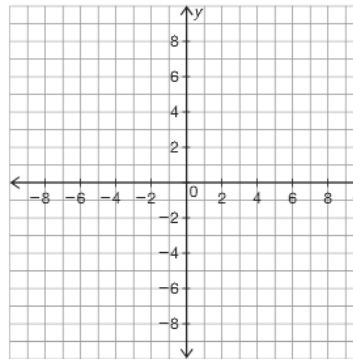
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10. Characteristics:

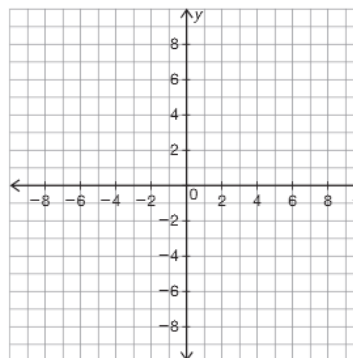
- as $x \rightarrow \infty, f(x) \rightarrow \infty$
as $x \rightarrow -\infty, f(x) \rightarrow -\infty$
- y-intercept at $y = -2$
- three x-intercepts
- two relative extrema



3

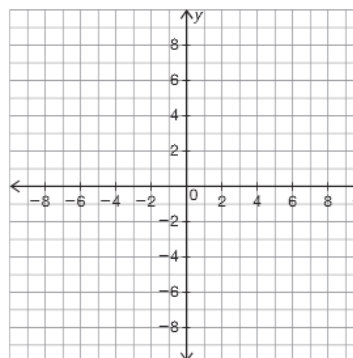
11. Characteristics:

- even degree
- positive a -value
- six x-intercepts
- absolute maximum at $y = 1$
- relative minimum at $y = -4$



12. Characteristics:

- always decreasing
- y-intercept at $y = -2.5$
- x-intercept at $x = -3$



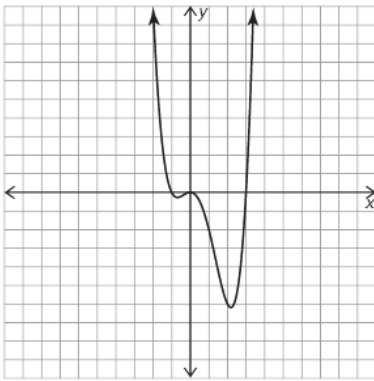
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Circle the function(s) that could model each graph. Describe your reasoning for either eliminating or choosing each function.

13.



$f(x) = x^4 - 2x^3 - 3x^2$

I chose this function because it represents an even degree polynomial with a positive a-value.

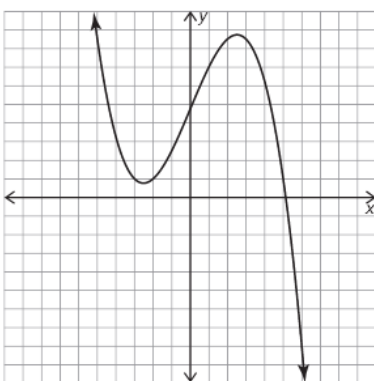
$f(x) = -2x^4 - 3x^2 - x$

I eliminated this function because the graph represents an even degree polynomial. This function has a negative a-value.

$f(x) = 2(x - 2)(x + 3)(x + 1)$

I eliminated this function because the graph represents an even degree function and this function is an odd degree.

14.



$f(x) = 4x^6 + 2x^3 - 1$

$f(x) = (x + 2)(x - 5)(x + 3) + 2$

$f(x) = -0.25(x + 2)(x - 5)(x + 3) + 2$

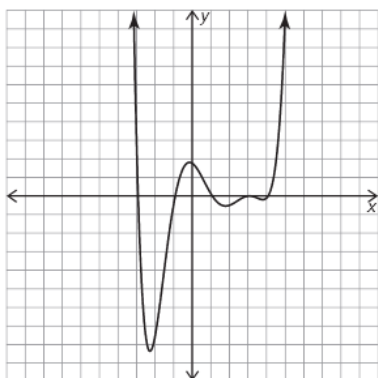
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15.



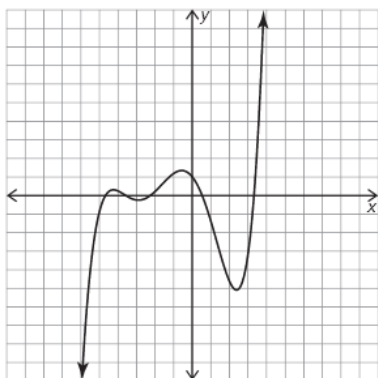
$$f(x) = -2x^6 - 13x^5 + 20x$$

$$f(x) = 2x^6 - 13x^5 + 26x^4 - 7x^3 - 28x^2 + 20x$$

$$f(x) = 2x(x + 7)(x - 4)(x + 3)(x - 2) - 3$$

3

16.



$$f(x) = 3x^6 + 20x^4 - 10x^3 - 240x^2 - 250x + 200$$

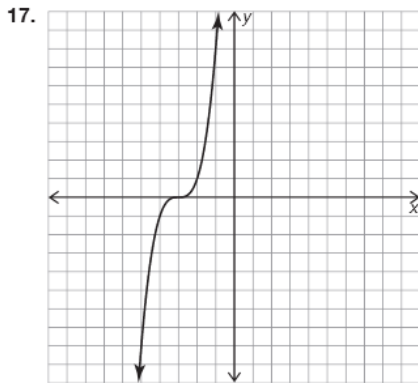
$$f(x) = (2x - 3)(x + 4)(x - 10)(x + 14) + 20$$

$$f(x) = -3x^7 + 15x^6 - 20x^2 + 125x - 150$$

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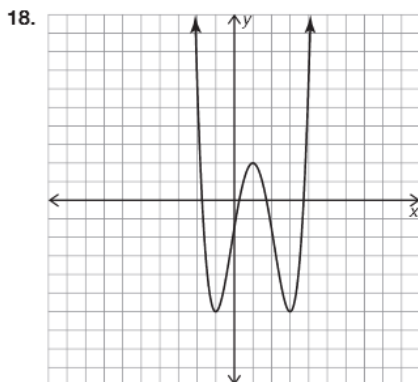
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$$f(x) = -x^3 + 2x^2 - x + 3$$

$$f(x) = \frac{1}{2}x(x + 3)^3$$

$$f(x) = (x + 3)^3$$



$$f(x) = x^3 - 4x^2 - 2x^2 + 12x - 3$$

$$f(x) = 2(x + 3)(x + 4)$$

$$f(x) = -2x^3 + x^4 - 3x^2 + 12$$

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