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Date _____
Algebra II



End Behavior and Shape of Polynomial Graphs

Sketch the shape and fill in the end behavior for each of the following polynomial equations

1. $f(x) = x^3 + 2x^2 - 9x - 18$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$

$x \rightarrow \infty, f(x) \rightarrow \infty$

positive, odd



2. $f(x) = x^4 - 10x^2 + 9$

$x \rightarrow -\infty, f(x) \rightarrow \infty$

$x \rightarrow \infty, f(x) \rightarrow \infty$

positive, even



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

$x \rightarrow -\infty, f(x) \rightarrow \infty$

$x \rightarrow \infty, f(x) \rightarrow -\infty$

negative, odd



4. $f(x) = -x^4 + 3x^3 + 10x^2$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$

$x \rightarrow \infty, f(x) \rightarrow -\infty$

negative, even



5. $p(x) = x^3 - 3x^2 - 9x + 27$

$x \rightarrow -\infty, f(x) \rightarrow -\infty$

$x \rightarrow \infty, f(x) \rightarrow \infty$

positive, odd



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

$x \rightarrow -\infty, f(x) \rightarrow \infty$

$x \rightarrow \infty, f(x) \rightarrow \infty$

positive, even



$$7. g(x) = -\frac{1}{2}x^5 - 4x^2 + 3x^2 - 7$$

$$x \rightarrow -\infty, f(x) \rightarrow \infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

negative, odd



$$8. f(x) = x^4 + 11x^3 + 15x^2 - 25x$$

$$x \rightarrow -\infty, f(x) \rightarrow \infty$$

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

positive, even



$$9. g(x) = -x^6 + 2x^3 + 4x^2 - 8x$$

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

negative, even



$$10. m(x) = 2x^3 + 4x^2 - 8x$$

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow \infty$$

positive, odd



$$11. f(x) = -2x^4 - 2x^3 + 34x^2 + 42x - 72$$

$$x \rightarrow -\infty, f(x) \rightarrow -\infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

negative, even



$$12. g(x) = -x^5 + 5x^4 + 8x^3 - 44x^2 - 32x + 64$$

$$x \rightarrow -\infty, f(x) \rightarrow \infty$$

$$x \rightarrow \infty, f(x) \rightarrow -\infty$$

negative, odd



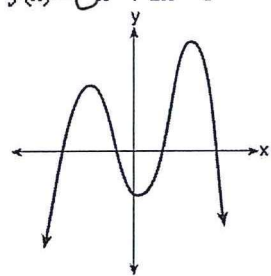
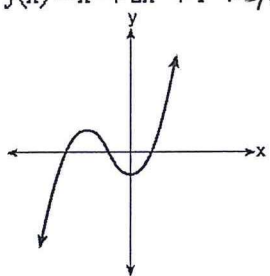
13. Consider the end behavior description below.

- as $x \rightarrow -\infty$, $f(x) \rightarrow \infty$ *left up*
- as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$ *right down*

Which function satisfies the given conditions?

1) $f(x) = x^3 + 2x^2 + 1$ *POS, even*

3) $f(x) = -x^3 + 2x - 6$ *neg, odd*



14. Which graph has the following characteristics?

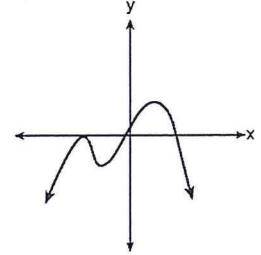
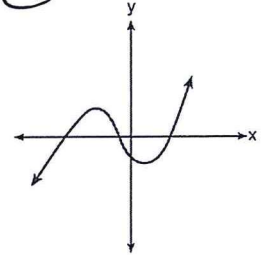
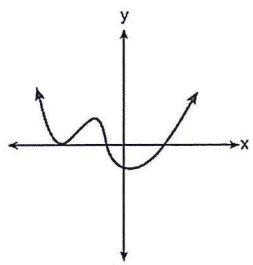
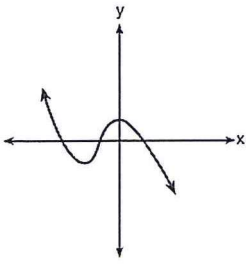
- three real zeros *down*
- as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$ *left down*
- as $x \rightarrow \infty$, $f(x) \rightarrow \infty$ *right up*

1)

2)

3)

4)



15. Which description could represent the graph of $f(x) = 4x^2(x+a) - x - a$, if a is an integer?

1) As $x \rightarrow -\infty$, $f(x) \rightarrow \infty$, as $x \rightarrow \infty$, $f(x) \rightarrow \infty$, and the graph has 3 x-intercepts.

3) As $x \rightarrow -\infty$, $f(x) \rightarrow \infty$, as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$, and the graph has 4 x-intercepts.

2) As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$, as $x \rightarrow \infty$, $f(x) \rightarrow \infty$, and the graph has 3 x-intercepts.

4) As $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$, as $x \rightarrow \infty$, $f(x) \rightarrow \infty$, and the graph has 4 x-intercepts.

4x^3 → 3 solutions positive, odd