This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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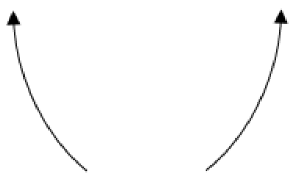
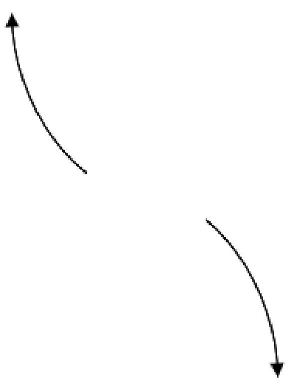
26. Describe the end behavior of the polynomial below.

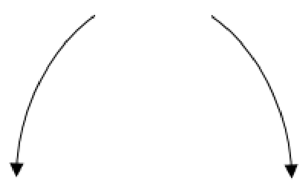
$$f(x) = 6(x+3)^2(x-3)^7(x+8)^4(x-8)^5$$

The solution is

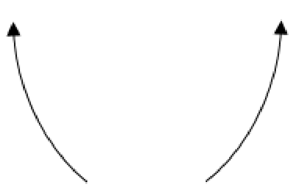




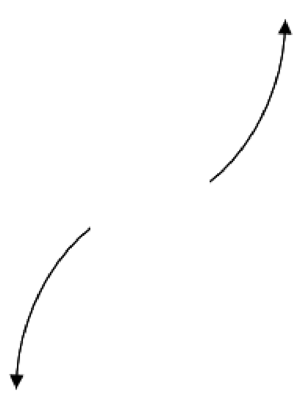
A.



B.



C.



D.

E. None of the figures above.

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General Comments: Remember that end behavior is determined by the leading coefficient AND whether the **sum** of the multiplicities is positive or negative.

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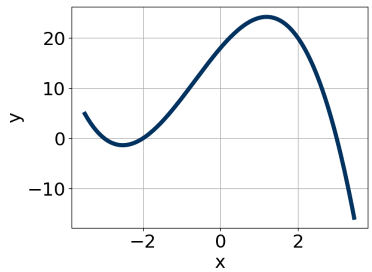
27. Which of the following equations *could* be of the graph presented below?



The solution is $-14(x+2)^7(x-3)^{11}(x+3)^9$

A. $13(x+2)^{11}(x-3)^5(x+3)^7$

   This corresponds to the leading coefficient being the opposite value than it should be.

B. $-14(x+2)^7(x-3)^{11}(x+3)^9$

   * This is the correct option.

C. $-8(x+2)^{10}(x-3)^9(x+3)^{11}$

   The factor -2 should have been an odd power.

D. $-12(x+2)^8(x-3)^{10}(x+3)^9$

   The factors -2 and 3 have have been odd power.

E. $5(x+2)^{10}(x-3)^7(x+3)^7$

   The factor $(x+2)$ should have an odd power and the leading coefficient should be the opposite sign.

General Comments: Draw the x-axis to determine which zeros are touching (and so have even multiplicity) or cross (and have odd multiplicity).

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28. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form ax^3+bx^2+cx+d.

$$\frac{4}{3}, -2, \text{ and } \frac{-2}{3}$$

The solution is $9x^3+12x^2-20x-16$

A. $a \in [4,13], b \in [35,39], c \in [43,46], \text{ and } d \in [13,26]$

   $9x^3+36x^2+44x+16$, which corresponds to multiplying out $(3x+3)(x-1)(3x-3)$.

B. $a \in [4,13], b \in [-7,6], c \in [-32,-23], \text{ and } d \in [-17,-5]$

   $9x^3-28x-16$, which corresponds to multiplying out $(3x+3)(x+1)(3x-3)$.

C. $a \in [4,13], b \in [4,14], c \in [-26,-18], \text{ and } d \in [13,26]$

   $9x^3+12x^2-20x+16$, which corresponds to multiplying everything correctly except the constant term.

D. $a \in [4,13], b \in [-13,-7], c \in [-26,-18], \text{ and } d \in [13,26]$

   $9x^3-12x^2-20x+16$, which corresponds to multiplying out $(3x+4)(x-2)(3x-2)$.

E. $a \in [4, 13], b \in [4, 14], c \in [-26, -18]$, and $d \in [-17, -5]$

* $9x^3 + 12x^2 - 20x - 16$, which is the correct option.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(3x-4)(x+2)(3x+2)$

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29. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$2 + 4i \text{ and } -3$$

The solution is $x^3 - 1x^2 + 8x + 60$

A. $b \in [0.76, 3.05], c \in [7.39, 9.98]$, and $d \in [-63, -57]$

$x^3 + x^2 + 8x - 60$, which corresponds to multiplying out $(x - (2 + 4i))(x - (2 - 4i))(x - 3)$.

B. $b \in [0.76, 3.05], c \in [0.43, 1.11]$, and $d \in [-7, -1]$

$x^3 + x^2 + x - 6$, which corresponds to multiplying out $(x - 2)(x + 3)$.

C. $b \in [-2.67, 0.41], c \in [7.39, 9.98]$, and $d \in [59, 65]$

* $x^3 - 1x^2 + 8x + 60$, which is the correct option.

D. $b \in [0.76, 3.05], c \in [-2.3, -0.94]$, and $d \in [-15, -9]$

$x^3 + x^2 - x - 12$, which corresponds to multiplying out $(x - 4)(x + 3)$.

E. None of the above.

This corresponds to making an unanticipated error or not understanding how to use nonreal complex numbers to create the lowest-degree polynomial. If you chose this and are not sure what you did wrong, please contact the coordinator for help.

General Comments: Remember that the conjugate of $a + bi$ is $a - bi$. Since these zeros always come in pairs, we need to multiply out $(x - (2 + 4i))(x - (2 - 4i))(x - (-3))$.

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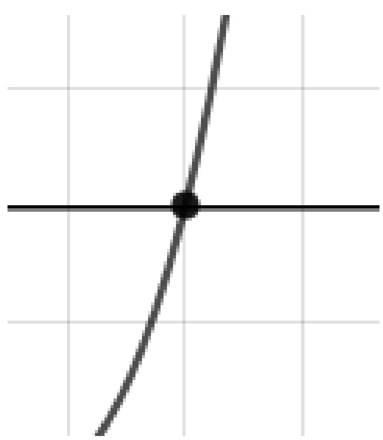
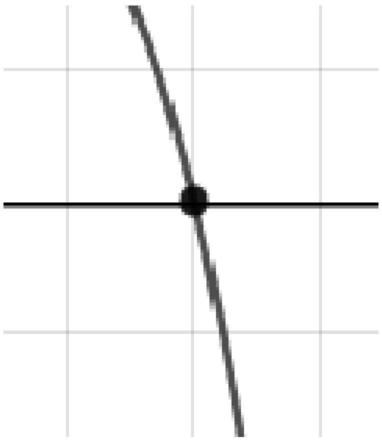
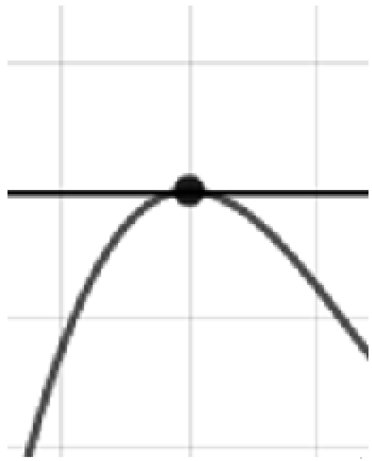
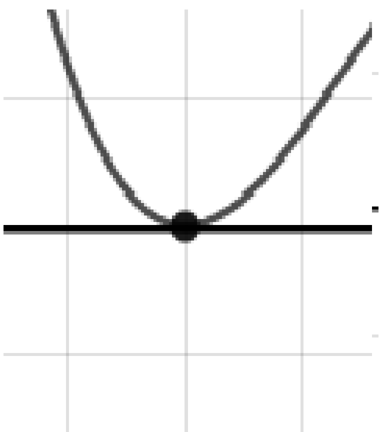
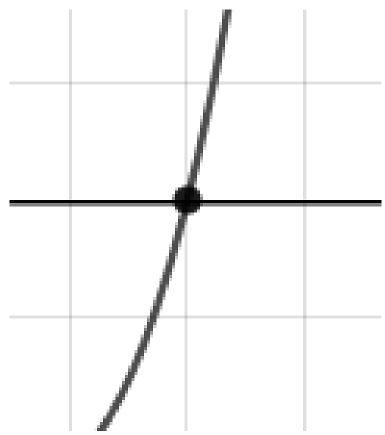
30. Describe the zero behavior of the zero $x = -6$ of the polynomial below.

$$f(x) = -2(x - 6)^4(x + 6)^7(x - 9)^3(x + 9)^5$$

The solution is



 **A.**	 **B.**
 **C.**	 **D.**
E. None of the figures above.	

General Comments: You will need to sketch the entire graph, then zoom in on the zero the question asks about.