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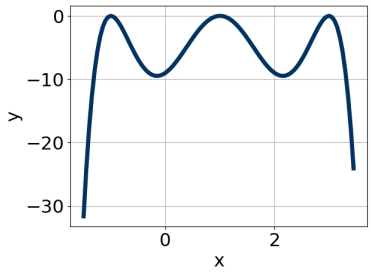
26. Which of the following equations *could* be of the graph presented below?



The solution is $-13(x-3)^6(x+1)^{10}(x-1)^8$

A. $-3(x-3)^4(x+1)^7(x-1)^7$

The factors $(x+1)$ and $(x-1)$ should both have even powers.

B. $20(x-3)^4(x+1)^6(x-1)^5$

The factor $(x-1)$ should have an even power and the leading coefficient should be the opposite sign.

C. $-13(x-3)^6(x+1)^{10}(x-1)^8$

* This is the correct option.

D. $-10(x-3)^6(x+1)^8(x-1)^{11}$

The factor $(x-1)$ should have an even power.

E. $13(x-3)^8(x+1)^8(x-1)^8$

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

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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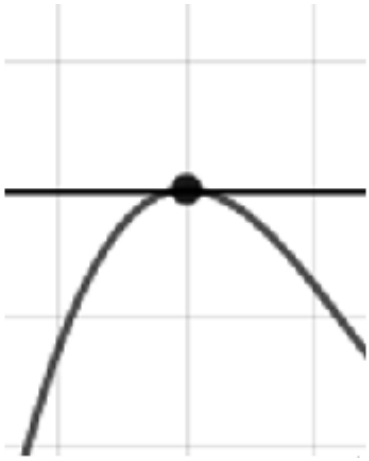
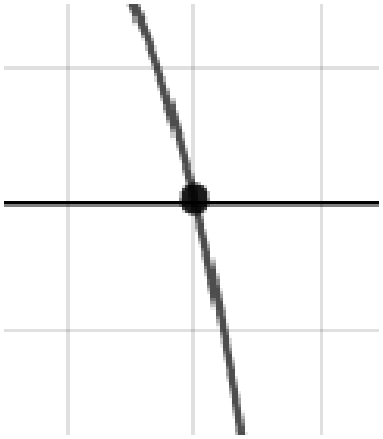
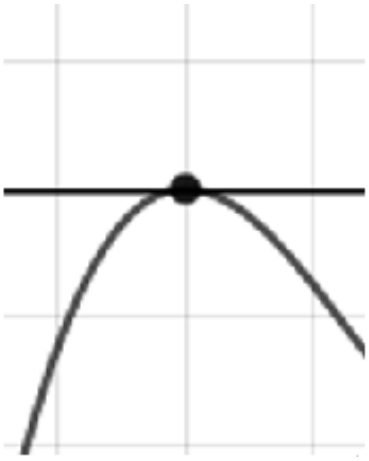
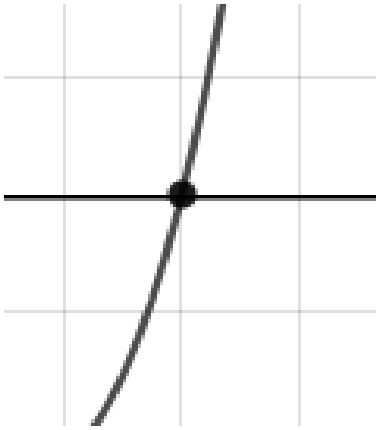
27. Describe the zero behavior of the zero $x=-9$ of the polynomial below.

$$f(x) = 2(x-2)^{10}(x+2)^6(x-9)^9(x+9)^8$$

The solution is

debug



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.

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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 $x^3 + bx^2 + cx + d$.

$$2 - 5i \text{ and } -3$$

debug

The solution is $x^3 - 1x^2 + 17x + 87$

A. $b \in [0.2, 1.4], c \in [10, 19],$ and $d \in [-89, -83]$

$x^3 + x^2 + 17x - 87$, which corresponds to multiplying out $(x - (2 - 5i))(x - (2 + 5i))(x - 3)$.

B. $b \in [0.2, 1.4], c \in [7, 14],$ and $d \in [10, 18]$

$x^3 + x^2 + 8x + 15$, which corresponds to multiplying out $(x + 5)(x + 3)$.

C. $b \in [0.2, 1.4], c \in [-1, 4],$ and $d \in [-8, -3]$

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

D. $b \in [-2, -0.7], c \in [10, 19],$ and $d \in [79, 89]$

* $x^3 - 1x^2 + 17x + 87$, which is the correct option.

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 $(x - (2 - 5i))(x - (2 + 5i))(x - (-3))$.

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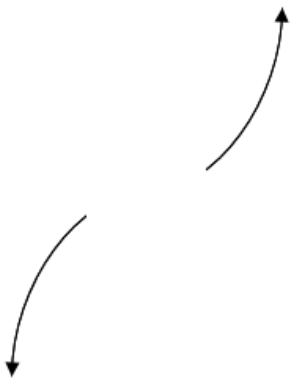
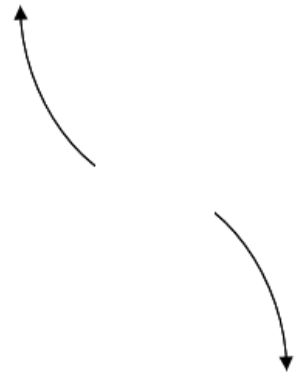
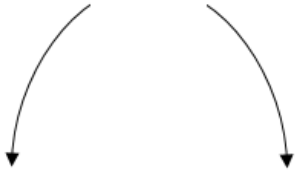
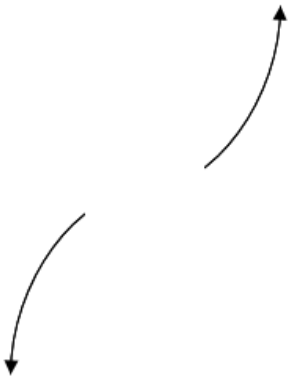
29. Describe the end behavior of the polynomial below.

$$f(x) = 6(x - 2)^5(x + 2)^8(x + 9)^2(x - 9)^4$$

The solution is



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

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

$$\frac{5}{2}, \frac{-4}{5}, \text{ and } \frac{2}{5}$$

The solution is $50x^3 - 105x^2 - 66x + 40$

A. $a \in [45, 62], b \in [101, 107], c \in [-71, -61],$ and $d \in [-41, -36]$

$50x^3 + 105x^2 - 66x - 40$, which corresponds to multiplying out $(2x + 5)(5x - 4)(5x + 2)$.

B. $a \in [45, 62], b \in [-113, -96], c \in [-71, -61],$ and $d \in [-41, -36]$

$50x^3 - 105x^2 - 66x - 40$, which corresponds to multiplying everything correctly except the constant term.

C. $a \in [45, 62], b \in [62, 69], c \in [-136, -133],$ and $d \in [30, 46]$

$50x^3 + 65x^2 - 134x + 40$, which corresponds to multiplying out $(2x + 2)(5x + 5)(5x - 5)$.

D. $a \in [45, 62], b \in [141, 146], c \in [31, 45],$ and $d \in [-41, -36]$

$50x^3 + 145x^2 + 34x - 40$, which corresponds to multiplying out $(2x + 2)(5x - 5)(5x - 5)$.

E. $a \in [45, 62], b \in [-113, -96], c \in [-71, -61],$ and $d \in [30, 46]$

* $50x^3 - 105x^2 - 66x + 40$, which is the correct option.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(2x - 5)(5x + 4)(5x - 2)$
