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

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

The solution is $x^3 - 11x^2 + 49x - 75$

A. $b \in [5, 19], c \in [48.59, 50.81],$ and $d \in [72.1, 78.9]$

$x^3 + 11x^2 + 49x + 75$, which corresponds to multiplying out $(x - (4 + 3i))(x - (4 - 3i))(x + 3)$.

B. $b \in [-13, -10], c \in [48.59, 50.81],$ and $d \in [-77.1, -71.8]$

* $x^3 - 11x^2 + 49x - 75$, which is the correct option.

C. $b \in [-7, 3], c \in [-6.36, -5.71],$ and $d \in [6.8, 11.3]$

$x^3 + x^2 - 6x + 9$, which corresponds to multiplying out $(x - 3)(x - 3)$.

D. $b \in [-7, 3], c \in [-7.02, -6.49],$ and $d \in [9.5, 14.3]$

$x^3 + x^2 - 7x + 12$, 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 $(x - (4 + 3i))(x - (4 - 3i))(x - (3))$.

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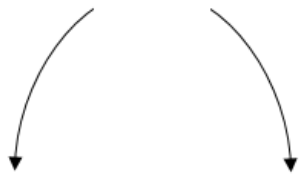
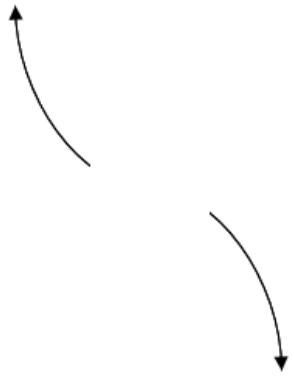
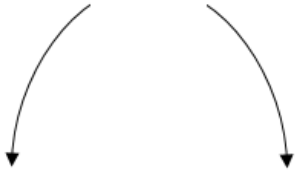
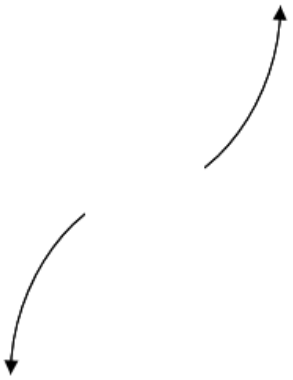
27. Describe the end behavior of the polynomial below.

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

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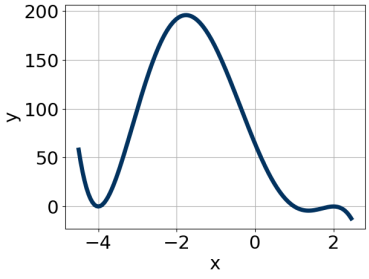
28. Which of the following equations *could* be of the graph presented below?



The solution is $-18(x+4)^{10}(x-2)^{6}(x-1)^{5}$

A. $-18(x+4)^{10}(x-2)^{6}(x-1)^{5}$

* This is the correct option.

B. $-19(x+4)^{8}(x-2)^{7}(x-1)^{7}$

The factor $(x-2)$ should have an even power.

C. $6(x+4)^6(x-2)^{10}(x-1)^9$

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

D. $-11(x+4)^6(x-2)^7(x-1)^4$

The factor $(x-2)$ should have an even power and the factor $(x-1)$ should have an odd power.

E. $19(x+4)^{10}(x-2)^6(x-1)^4$

The factor $(x-1)$ 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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29. 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.

$$\frac{-3}{5}, \frac{-1}{4}, \text{ and } \frac{4}{5}$$

The solution is $100x^3+5x^2-53x-12$

A. $a \in [98,103], b \in [-167,-160], c \in [81,89],$ and $d \in [-13,-10]$

$100x^3-165x^2+83x-12$, which corresponds to multiplying out $(5x+5)(4x+4)(5x-5)$.

B. $a \in [98,103], b \in [-1,6], c \in [-56,-46],$ and $d \in [6,15]$

$100x^3+5x^2-53x+12$, which corresponds to multiplying everything correctly except the constant term.

C. $a \in [98,103], b \in [-15,-3], c \in [-56,-46],$ and $d \in [6,15]$

$100x^3-5x^2-53x+12$, which corresponds to multiplying out $(5x-3)(4x-1)(5x+4)$.

D. $a \in [98,103], b \in [-118,-107], c \in [4,17],$ and $d \in [6,15]$

$100x^3-115x^2+13x+12$, which corresponds to multiplying out $(5x+5)(4x-4)(5x-5)$.

E. $a \in [98,103], b \in [-1,6], c \in [-56,-46],$ and $d \in [-13,-10]$

* $100x^3+5x^2-53x-12$, which is the correct option.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(5x+3)(4x+1)(5x-4)$

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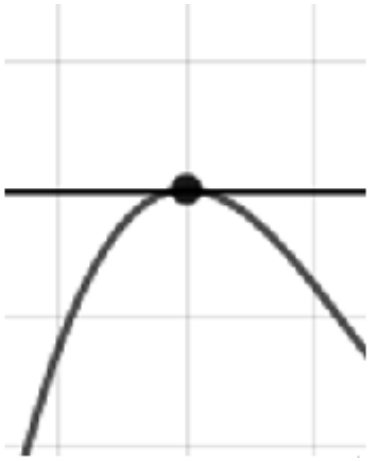
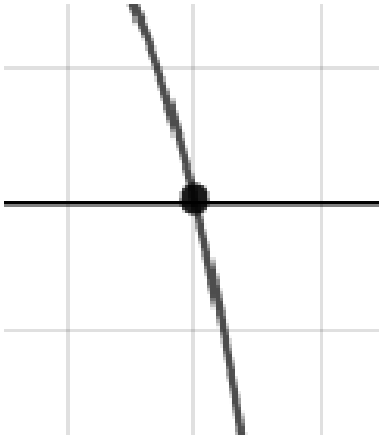
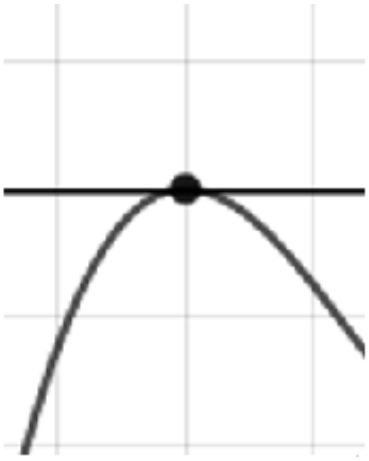
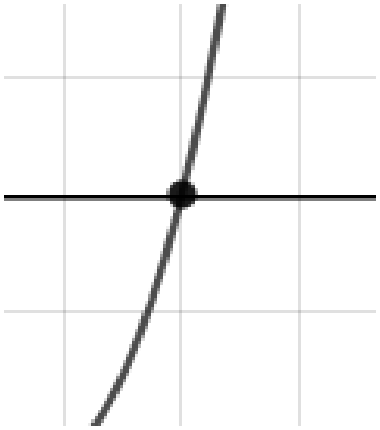
30. Describe the zero behavior of the zero $x=-4$ of the polynomial below.

$$f(x)=3(x-4)^5(x+4)^{10}(x+7)^6(x-7)^8$$

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.