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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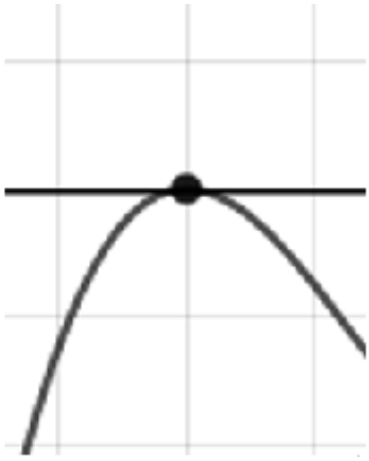
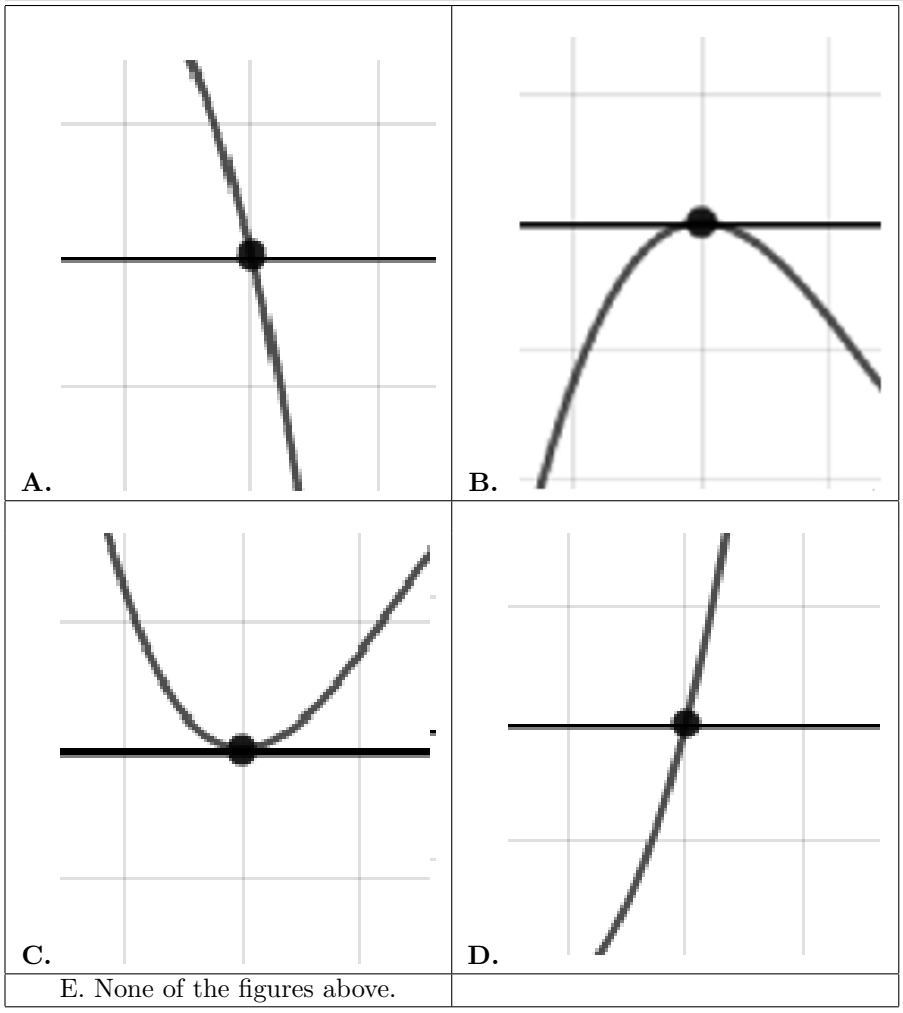
26. Describe the zero behavior of the zero $x = -8$ of the polynomial below.

$$f(x) = 7(x-5)^7(x+5)^5(x+8)^{14}(x-8)^9$$

The solution is





A.

B.

C.

D.

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

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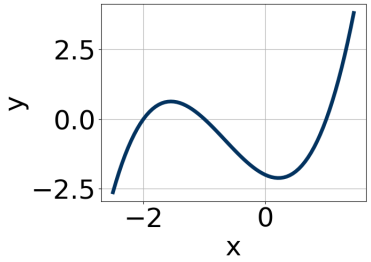
27. Which of the following equations *could* be of the graph presented below?



The solution is $14(x+1)^5(x-1)^5(x+2)^5$

A. $-2(x+1)^9(x-1)^9(x+2)^5$

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

B. $10(x+1)^{10}(x-1)^4(x+2)^5$

The factors -1 and 1 have have been odd power.

C. $15(x+1)^{10}(x-1)^7(x+2)^5$

The factor -1 should have been an odd power.

D. $-8(x+1)^{10}(x-1)^{11}(x+2)^9$

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

E. $14(x+1)^5(x-1)^5(x+2)^5$

* This is the correct option.

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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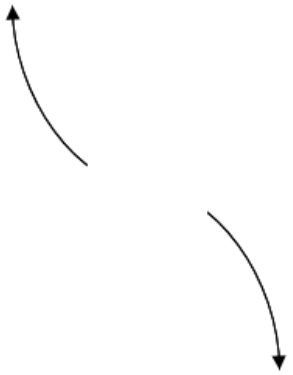
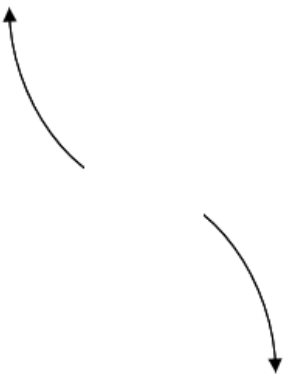
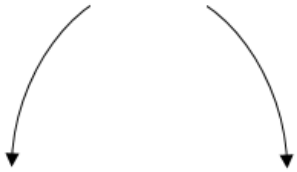
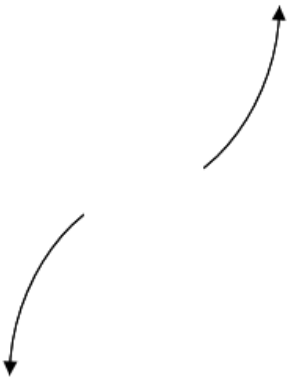
28. Describe the end behavior of the polynomial below.

$$f(x) = -9(x-8)^2(x+8)^7(x-5)^2(x+5)^2$$

The solution is



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

A. The function is above the x-axis, then passes through.

B. The function is below the x-axis, then touches.

C. The function is above the x-axis, then touches.

D. The function is below the x-axis, then passes through.

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

$$3, \frac{7}{4}, \text{ and } \frac{-3}{2}$$

The solution is $8x^3 - 26x^2 - 15x + 63$

A. $a \in [-2, 10], b \in [24, 30], c \in [-21, -7],$ and $d \in [-69, -61]$

$8x^3 + 26x^2 - 15x - 63$, which corresponds to multiplying out $(x + 3)(4x + 7)(2x - 3)$.

B. $a \in [-2, 10], b \in [37, 52], c \in [94, 102],$ and $d \in [62, 64]$

$8x^3 + 50x^2 + 99x + 63$, which corresponds to multiplying out $(x + 1)(4x + 4)(2x - 2)$.

C. $a \in [-2, 10], b \in [21, 24], c \in [-28, -25],$ and $d \in [-69, -61]$

$8x^3 + 22x^2 - 27x - 63$, which corresponds to multiplying out $(x + 1)(4x - 4)(2x - 2)$.

D. $a \in [-2, 10], b \in [-31, -20], c \in [-21, -7],$ and $d \in [-69, -61]$

$8x^3 - 26x^2 - 15x - 63$, which corresponds to multiplying everything correctly except the constant term.

E. $a \in [-2, 10], b \in [-31, -20], c \in [-21, -7],$ and $d \in [62, 64]$

* $8x^3 - 26x^2 - 15x + 63$, which is the correct option.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(x-3)(4x-7)(2x+3)$

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

$$-3 + 4i \text{ and } -1$$

The solution is $x^3 + 7x^2 + 31x + 25$

A. $b \in [5, 13], c \in [26, 32],$ and $d \in [18, 31]$

* $x^3 + 7x^2 + 31x + 25$, which is the correct option.

B. $b \in [-1, 4], c \in [-9, -2],$ and $d \in [-7, 0]$

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

C. $b \in [-9, -5], c \in [26, 32],$ and $d \in [-33, -20]$

$x^3 - 7x^2 + 31x - 25$, which corresponds to multiplying out $(x - (-3 + 4i))(x - (-3 - 4i))(x - 1)$.

D. $b \in [-1, 4], c \in [1, 9],$ and $d \in [-1, 6]$

$x^3 + x^2 + 4x + 3$, which corresponds to multiplying out $(x + 3)(x + 1)$.

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 $(x - (-3 + 4i))(x - (-3 - 4i))(x - (-1))$.
