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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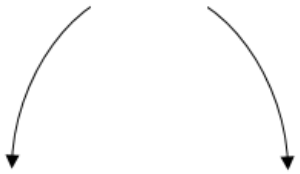
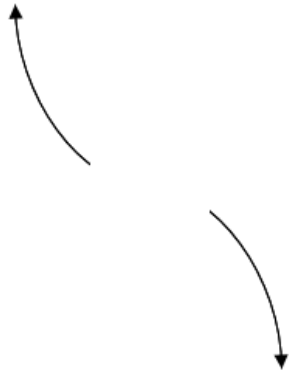
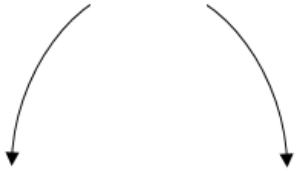
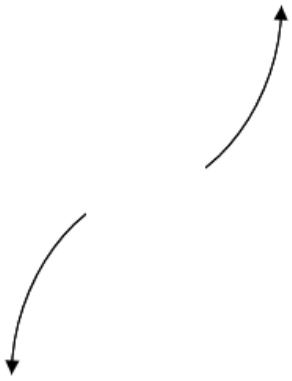
26. Describe the end behavior of the polynomial below.

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

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

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

The solution is $x^3 - 12x^2 + 52x - 80$

A. $b \in [-2, 2], c \in [-12, -6],$ and $d \in [15, 19]$

$x^3 + x^2 - 8x + 16$, which corresponds to multiplying out $(x - 4)(x - 4)$.

B. $b \in [5, 17], c \in [44, 60],$ and $d \in [79, 89]$

$x^3 + 12x^2 + 52x + 80$, which corresponds to multiplying out $(x - (4 - 2i))(x - (4 + 2i))(x + 4)$.

C. $b \in [-2, 2], c \in [-7, 2],$ and $d \in [-12, -5]$

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

D. $b \in [-19, -9], c \in [44, 60],$ and $d \in [-83, -74]$

* $x^3 - 12x^2 + 52x - 80$, 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 $(x - (4 - 2i))(x - (4 + 2i))(x - (4))$.

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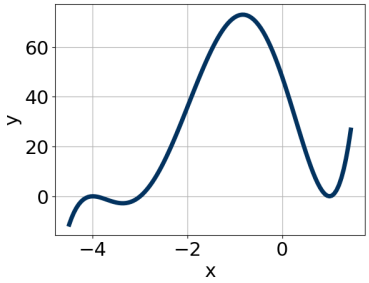
28. Which of the following equations *could* be of the graph presented below?



The solution is $2(x - 1)^6(x + 4)^8(x + 3)^5$

A. $3(x - 1)^4(x + 4)^7(x + 3)^{11}$

The factor $(x + 4)$ should have an even power.

B. $2(x - 1)^6(x + 4)^8(x + 3)^5$

* This is the correct option.

C. $16(x - 1)^6(x + 4)^5(x + 3)^{10}$

The factor $(x + 4)$ should have an even power and the factor $(x + 3)$ should have an odd power.

D. $-17(x-1)^8(x+4)^8(x+3)^{10}$

The factor $(x+3)$ should have an odd power and the leading coefficient should be the opposite sign.

E. $-13(x-1)^8(x+4)^4(x+3)^{11}$

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

$$-2, -3, \text{ and } \frac{2}{5}$$

The solution is $5x^3 + 23x^2 + 20x - 12$

A. $a \in [3, 6], b \in [22.5, 25.8], c \in [18, 22],$ and $d \in [8, 19]$

$5x^3+23x^2+20x+12$, which corresponds to multiplying everything correctly except the constant term.

B. $a \in [3, 6], b \in [-28.1, -24.8], c \in [37, 45],$ and $d \in [-13, -8]$

$5x^3 - 27x^2 + 40x - 12$, which corresponds to multiplying out $(x+1)(x+1)(5x-5)$.

C. $a \in [3, 6], b \in [-26.2, -20.1], c \in [18, 22],$ and $d \in [8, 19]$

$5x^3 - 23x^2 + 20x + 12$, which corresponds to multiplying out $(x-2)(x-3)(5x+2)$.

D. $a \in [3, 6], b \in [22.5, 25.8], c \in [18, 22],$ and $d \in [-13, -8]$

* $5x^3 + 23x^2 + 20x - 12$, which is the correct option.

E. $a \in [3, 6], b \in [0.9, 6.3], c \in [-39, -23],$ and $d \in [8, 19]$

$5x^3 + 3x^2 - 32x + 12$, which corresponds to multiplying out $(x+1)(x-1)(5x-5)$.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(x+2)(x+3)(5x-2)$

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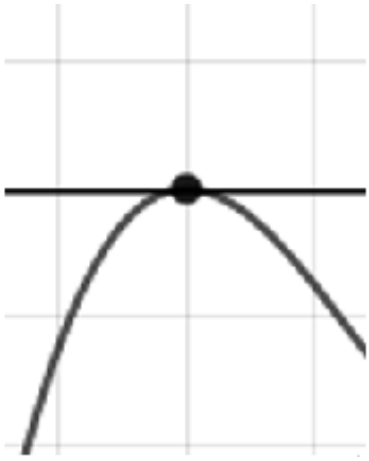
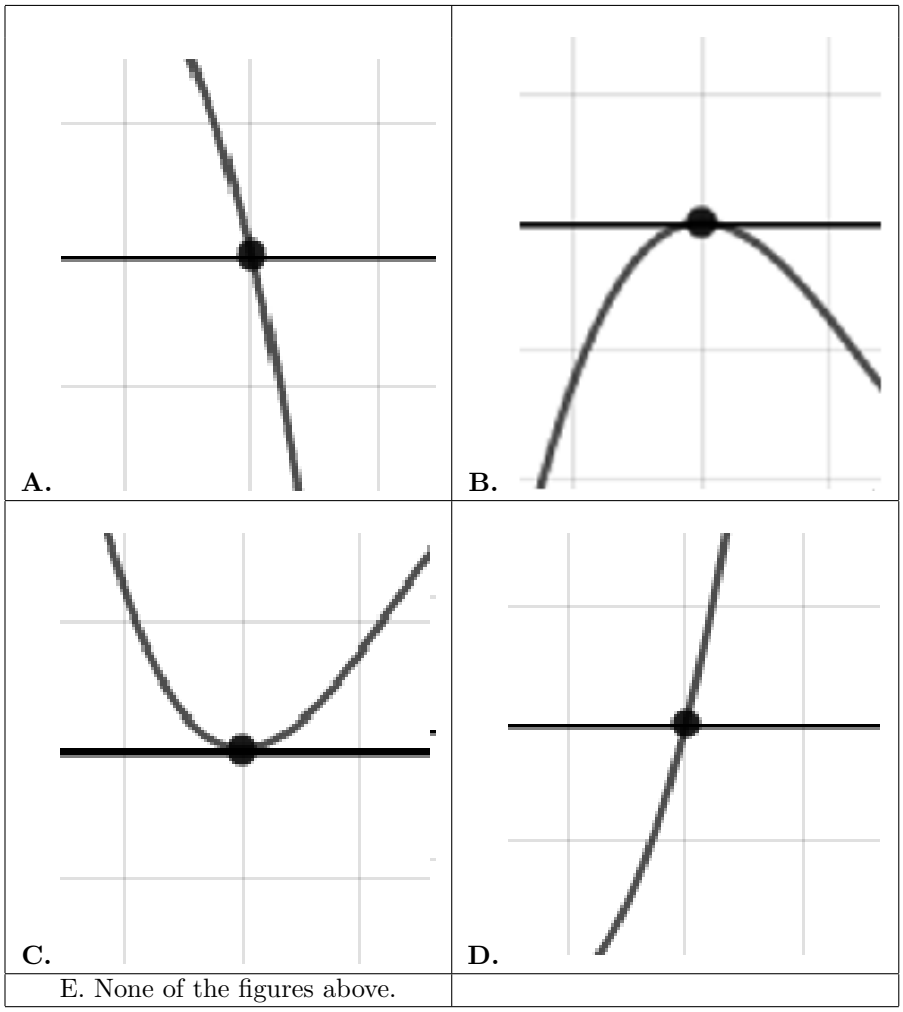
30. Describe the zero behavior of the zero $x = 2$ of the polynomial below.

$$f(x) = -5(x-6)^{10}(x+6)^9(x-2)^8(x+2)^7$$

The solution is





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.