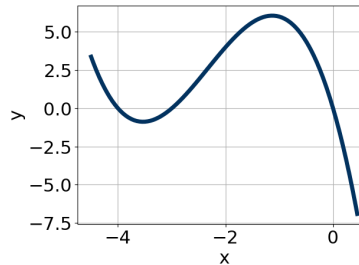


This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found [here](#).

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.

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



The solution is $-12x^7(x+4)^{11}(x+3)^5$

A. $3x^{11}(x+4)^9(x+3)^7$

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

B. $-16x^5(x+4)^6(x+3)^9$

The factor -4 should have been an odd power.

C. $13x^7(x+4)^8(x+3)^{11}$

The factor $(x+4)$ should have an odd power and the leading coefficient should be the opposite sign.

D. $-12x^7(x+4)^{11}(x+3)^5$

* This is the correct option.

E. $-8x^7(x+4)^4(x+3)^{10}$

The factors -4 and -3 have have been odd power.

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

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

$$2 + 5i \text{ and } -1$$

The solution is $x^3 - 3x^2 + 25x + 29$

A. $b \in [0.34, 1.62]$, $c \in [-2.4, 2]$, and $d \in [-2.7, -1.7]$

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

B. $b \in [0.34, 1.62]$, $c \in [-4.5, -2.8]$, and $d \in [-6.2, -2.6]$

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

C. $b \in [2.13, 4.2]$, $c \in [22.8, 25.3]$, and $d \in [-31.7, -26.8]$

$x^3 + 3x^2 + 25x - 29$, which corresponds to multiplying out $(x - (2 + 5i))(x - (2 - 5i))(x - 1)$.

D. $b \in [-4, -2.79]$, $c \in [22.8, 25.3]$, and $d \in [25.8, 29.8]$

* $x^3 - 3x^2 + 25x + 29$, 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 $(x - (2 + 5i))(x - (2 - 5i))(x - (-1))$.

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

$$\frac{-1}{3}, \frac{6}{5}, \text{ and } \frac{-4}{5}$$

The solution is $75x^3 - 5x^2 - 82x - 24$

A. $a \in [73, 89]$, $b \in [-9, -3]$, $c \in [-92, -72]$, and $d \in [-25, -23]$

* $75x^3 - 5x^2 - 82x - 24$, which is the correct option.

B. $a \in [73, 89]$, $b \in [-1, 6]$, $c \in [-92, -72]$, and $d \in [23, 30]$

$75x^3 + 5x^2 - 82x + 24$, which corresponds to multiplying out $(3x - 1)(5x + 6)(5x - 4)$.

C. $a \in [73, 89]$, $b \in [-9, -3]$, $c \in [-92, -72]$, and $d \in [23, 30]$

$75x^3 - 5x^2 - 82x + 24$, which corresponds to multiplying everything correctly except the constant term.

D. $a \in [73, 89]$, $b \in [-58, -52]$, $c \in [-64, -57]$, and $d \in [23, 30]$

$75x^3 - 55x^2 - 62x + 24$, which corresponds to multiplying out $(3x + 3)(5x - 5)(5x - 5)$.

E. $a \in [73, 89]$, $b \in [124, 136]$, $c \in [16, 26]$, and $d \in [-25, -23]$

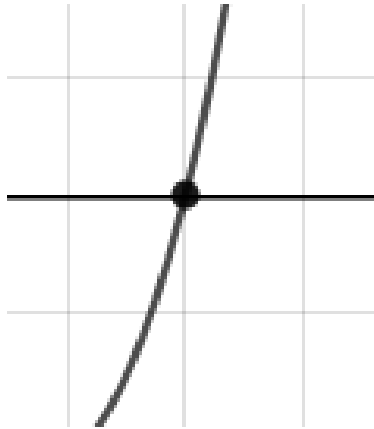
$75x^3 + 125x^2 + 22x - 24$, which corresponds to multiplying out $(3x + 3)(5x + 5)(5x - 5)$.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(3x + 1)(5x - 6)(5x + 4)$

29. Describe the zero behavior of the zero $x = -5$ of the polynomial below.

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

The solution is



<p>A.</p>	<p>B.</p>
<p>C.</p>	<p>D.</p>
<p>E. None of the figures above.</p>	

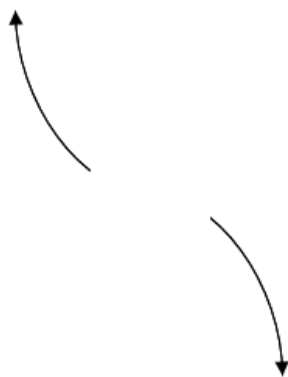
General Comments: You will need to sketch the entire graph, then zoom in on the zero the question asks about.

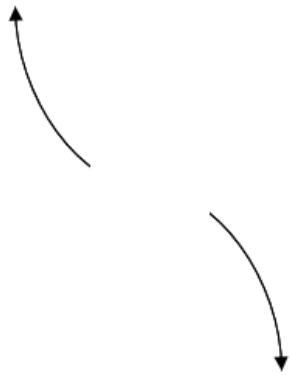
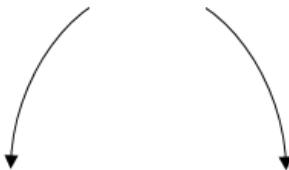

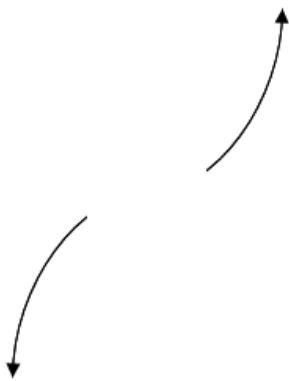
30. Describe the end behavior of the polynomial below.

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

The solution is

debug



 <p>A.</p>	 <p>B.</p>
 <p>C.</p>	 <p>D.</p>
<p>E. None of the figures above.</p>	

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