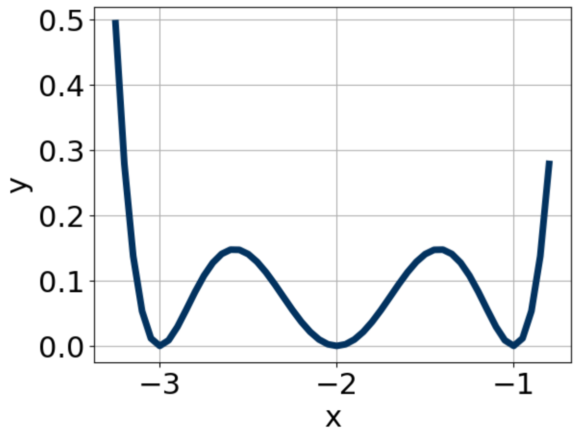
This is the Answer Key for Module 6 Version MU.

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



The solution is $(x+2)^2(x+3)^2(x+1)^2$

A. $-(x+2)^2(x+3)^2(x+1)$

B. $(x+2)^2(x+3)(x+1)$

C. $(x+2)^2(x+3)^2(x+1)^2$

D. $(x+2)^2(x+3)^2(x+1)$

E. $-(x+2)^2(x+3)^2(x+1)^2$

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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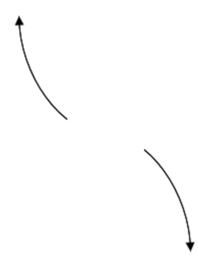
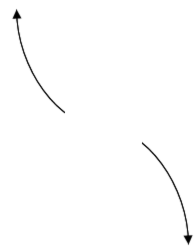
27. Choose the end behavior of the polynomial below.

$$f(x) = -8(x+3)^3(x-3)^8(x-6)^2(x+6)^4$$

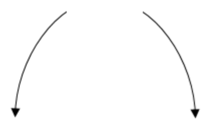
The solution is



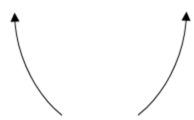
A. Negative leading coefficient, sum of degrees is odd.



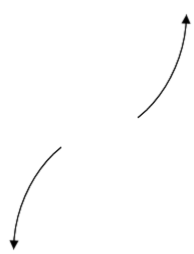
B. Negative leading coefficient, sum of degrees is even.



C. Positive leading coefficient, sum of degrees is even.



D. Positive leading coefficient, sum of degrees is odd.



General Comments: Remember that end behavior is determined by the leading coefficient AND the sum of the multiplicities.

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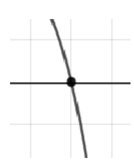
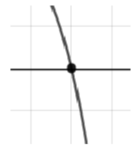
28. Describe the zero behavior of the zero $x = -3$ of the polynomial below.

$$f(x) = -8(x+3)^3(x-3)^8(x-6)^2(x+6)^4$$

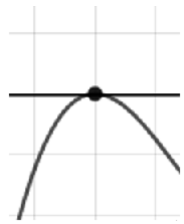
The solution is



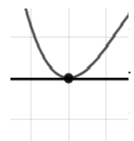
A. The function is above the x-axis, then passes through.



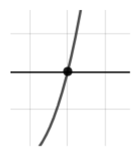
B. The function is below the x-axis, then touches.



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



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



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

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

$$4, \frac{-2}{5}, \text{ and } \frac{3}{5}$$

The solution is $25x^3 - 105x^2 + 14x + 24$

A. $a \in [21, 28], b \in [-107, -101], c \in [11, 15], \text{ and } d \in [17, 28]$

  * This is the correct solution

B. $a \in [21, 28], b \in [-107, -101], c \in [11, 15], \text{ and } d \in [-30, -21]$

  Distractor 2: This corresponds to having everything correct except the sign of the last term.

C. $a \in [21, 28], b \in [92, 97], c \in [-32, -20], \text{ and } d \in [-30, -21]$

  Distractor 3: This corresponds to using $(x + z_1)$ for the first term.

D. $a \in [21, 28], b \in [103, 107], c \in [11, 15], \text{ and } d \in [-30, -21]$

  Distractor 1: This corresponds to multiplying $(x + z_1)(x + z_2)(x + z_3)$

E. $a \in [21, 28], b \in [68, 77], c \in [-101, -91], \text{ and } d \in [17, 28]$

  Distractor 4: This corresponds to using $(x + z_1)(x + z_2)$ for the first two terms.

General Comments: To construct the lowest-degree polynomial, you want to multiply out $(1x - 4)(5x - -2)(5x - 3)$

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

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

The solution is $x^3 + 1x^2 + 4x + 4$

A. $b \in [-3, 0.1], c \in [3.29, 4.02], \text{ and } d \in [-5.7, -1.9]$

   Distractor 1: This distractor corresponds to using (x+z) for zeros.

B. $b \in [-3, 0.1], c \in [-4.15, -3.73], \text{ and } d \in [-5.7, -1.9]$

   Distractor 4: This distractor corresponds to negatives for each of the coefficients in the solution.

C. $b \in [0.6, 1.5], c \in [3.29, 4.02], \text{ and } d \in [3.4, 5.1]$

   * This is the correct solution

D. $b \in [0.6, 1.5], c \in [2.96, 3.43], \text{ and } d \in [0.4, 3.2]$

   Distractor 3: This distractor corresponds to using b from the complex and the other zero to make a quadratic.

E. $b \in [0.6, 1.5], c \in [0.47, 1.77], \text{ and } d \in [-1.7, 1.9]$

   Distractor 2: This distractor corresponds to using a from the complex and the other zero to make a quadratic.

General Comments: Remember that the conjugate of $a + bi$ is $a - bi$. Since these zeros always come in pairs, we need to multiply out $(x - -2i)(x + -2i)(x - -1)$
