1. Describe the end behavior of the polynomial below.

$$f(x) = -9(x-4)^3(x+4)^8(x+9)^3(x-9)^3$$

C.

A.

B.   D.

E. None of the above.

---
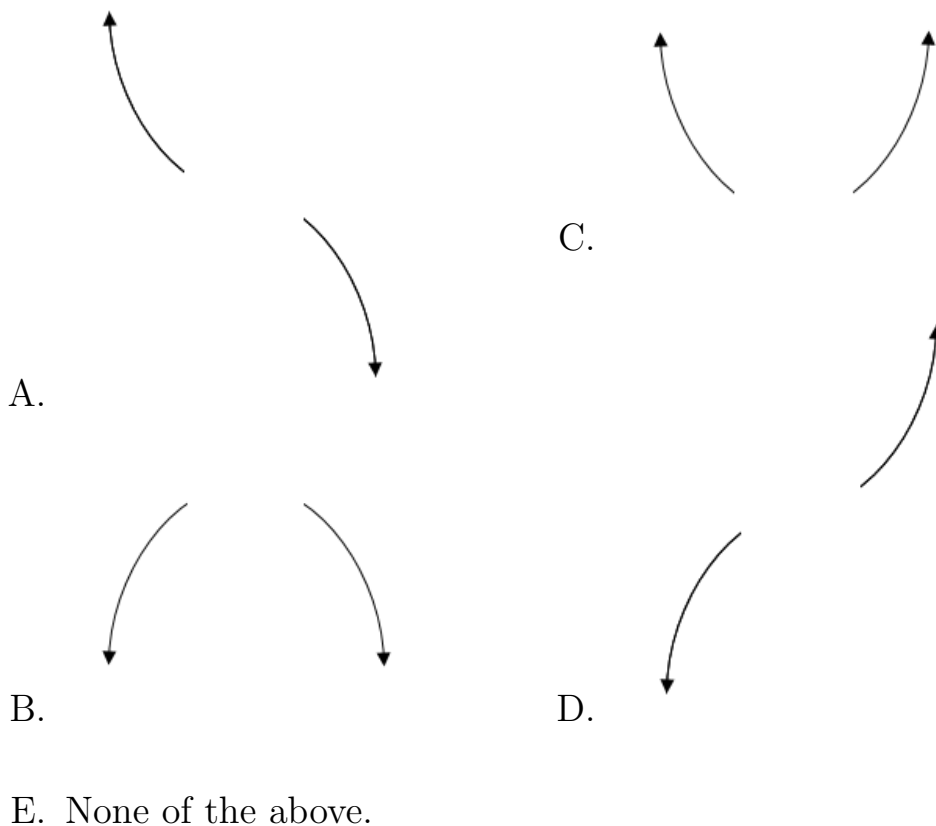
2. Which of the following equations *could* be of the graph presented below?
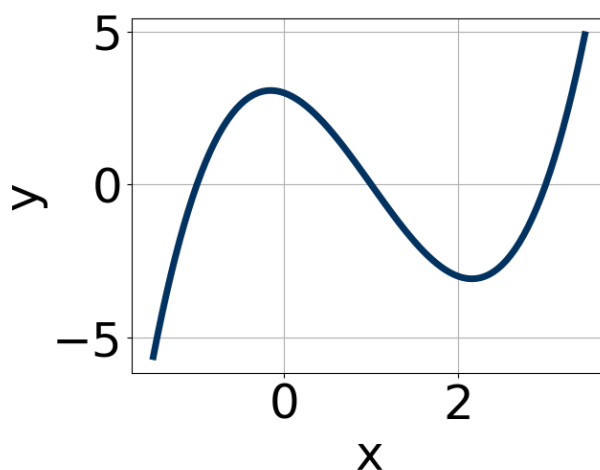
A. $-14(x+1)^5(x-3)^{11}(x-1)^9$

B. $20(x + 1)^6(x - 3)^{10}(x - 1)^5$

C. $12(x + 1)^4(x - 3)^5(x - 1)^9$

D. $-11(x + 1)^{10}(x - 3)^5(x - 1)^7$

E. $6(x + 1)^{11}(x - 3)^{11}(x - 1)^9$

---

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

$$\frac{3}{5}, -5, \text{ and } -7$$

A. $a \in [3, 17], b \in [-61, -55], c \in [131, 141], \text{ and } d \in [104, 111]$

B. $a \in [3, 17], b \in [62, 68], c \in [208, 220], \text{ and } d \in [104, 111]$

C. $a \in [3, 17], b \in [56, 59], c \in [131, 141], \text{ and } d \in [104, 111]$

D. $a \in [3, 17], b \in [4, 14], c \in [-173, -167], \text{ and } d \in [-106, -101]$

E. $a \in [3, 17], b \in [56, 59], c \in [131, 141], \text{ and } d \in [-106, -101]$

---

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

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

A. $b \in [0.1, 1.1], c \in [-0.68, 0.29], \text{ and } d \in [-17.9, -15.3]$

B. $b \in [3, 6.4], c \in [-7.36, -6.73], \text{ and } d \in [-101.4, -98.9]$

C. $b \in [0.1, 1.1], c \in [0.54, 2.17], \text{ and } d \in [-13.2, -10.4]$

D. $b \in [-5, -2.6], c \in [-7.36, -6.73], \text{ and } d \in [98.6, 102.8]$

E. None of the above.

---

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

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

A. $a \in [6, 11], b \in [-7, -3], c \in [-23, -21], \text{ and } d \in [23, 25]$

B. $a \in [6, 11], b \in [-15, -9], c \in [-14, -11], \text{ and } d \in [23, 25]$

C. $a \in [6, 11], b \in [8, 16], c \in [-14, -11], \text{ and } d \in [-31, -20]$

D. $a \in [6, 11], b \in [-35, -27], c \in [46, 47], \text{ and } d \in [-31, -20]$

E. $a \in [6, 11], b \in [8, 16], c \in [-14, -11], \text{ and } d \in [23, 25]$

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

$$-5 + 4i \text{ and } -3$$

A. $b \in [12, 15], c \in [60, 72], \text{ and } d \in [122, 124]$

B. $b \in [-6, 3], c \in [-9, 0], \text{ and } d \in [-15, -4]$

C. $b \in [-18, -8], c \in [60, 72], \text{ and } d \in [-124, -121]$

D. $b \in [-6, 3], c \in [6, 14], \text{ and } d \in [6, 19]$
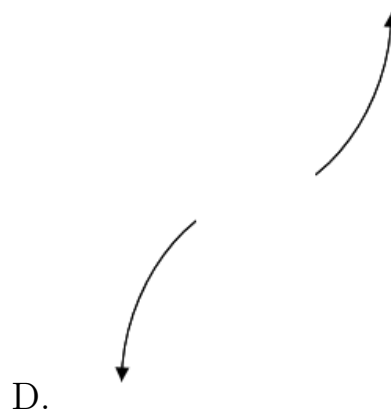
E. None of the above.

7. Describe the end behavior of the polynomial below.
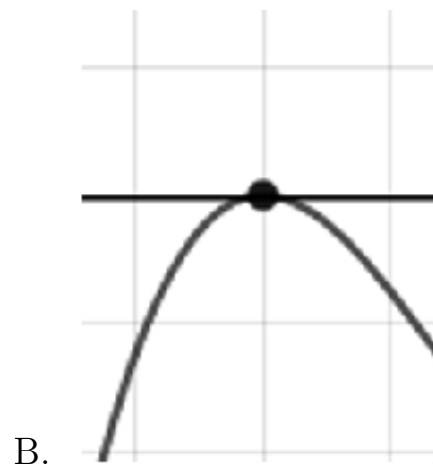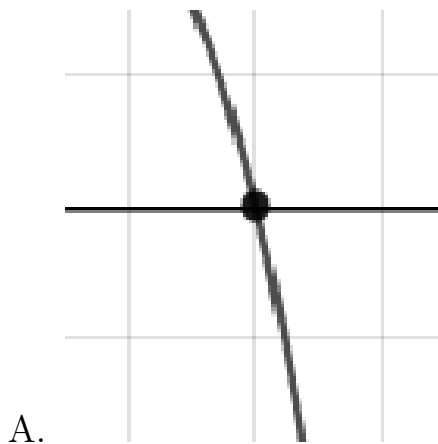
$$f(x) = -8(x - 2)^4(x + 2)^7(x + 8)^2(x - 8)^3$$

B.

D.
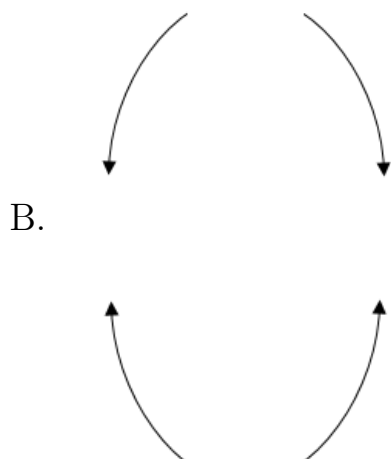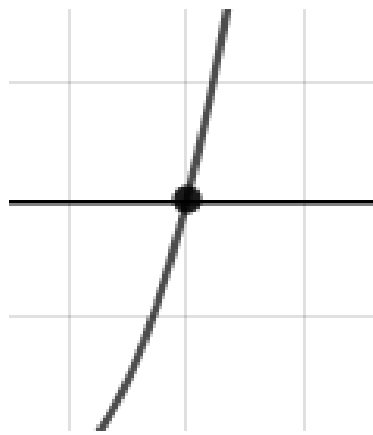
C.

E. None of the above.

---

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

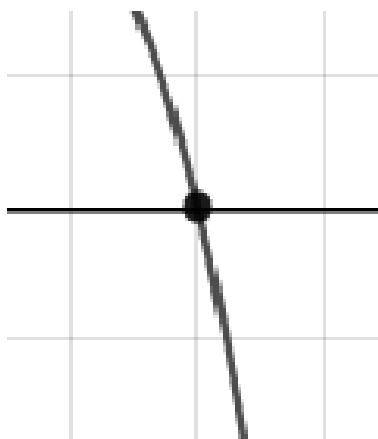$$f(x) = 6(x - 2)^4(x + 2)^3(x + 8)^6(x - 8)^3$$

A.

B.

C.

D.

E. None of the above.

9. Describe the zero behavior of the zero $x = -9$ of the polynomial below.
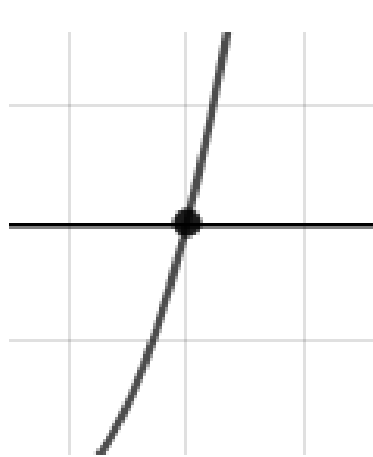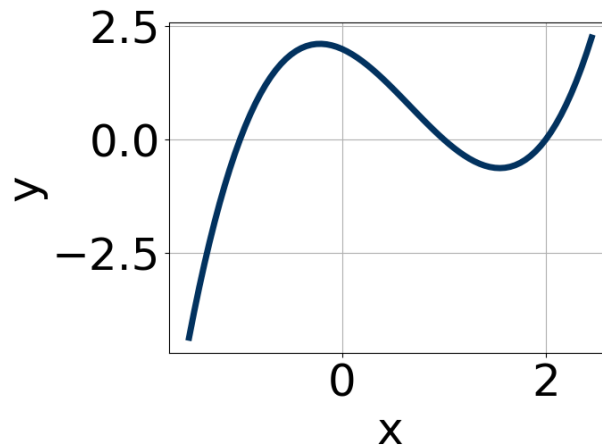
$$f(x) = 3(x+9)^8(x-9)^9(x-4)^3(x+4)^7$$

A.

C.

B.

D.

E. None of the above.

---

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

A. $13(x-1)^{11}(x+1)^{11}(x-2)^{5}$

B. $14(x-1)^{4}(x+1)^{9}(x-2)^{9}$

C. $-10(x-1)^{5}(x+1)^{9}(x-2)^{11}$

D. $-19(x-1)^{10}(x+1)^{9}(x-2)^{9}$

E. $9(x-1)^{4}(x+1)^{8}(x-2)^{11}$