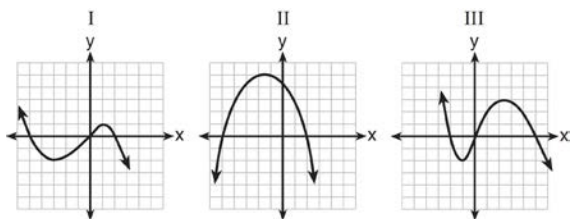
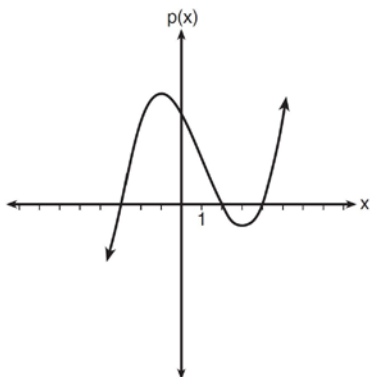


### A.APR.B.3: Graphing Polynomial Functions

- 1 A polynomial function contains the factors  $x$ ,  $x - 2$ , and  $x + 5$ . Which graph(s) below could represent the graph of this function?

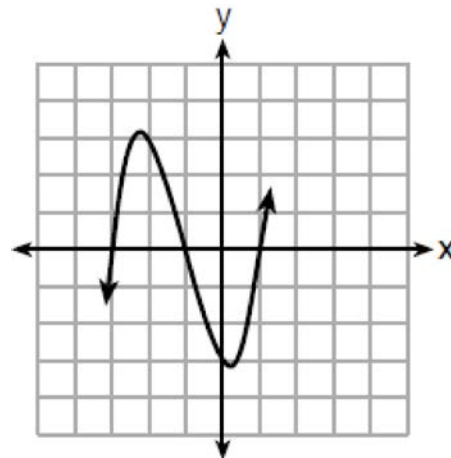


- 1) I, only
  - 2) II, only
  - 3) I and III
  - 4) I, II, and III
- 2 Based on the graph below, which expression is a possible factorization of  $p(x)$ ?



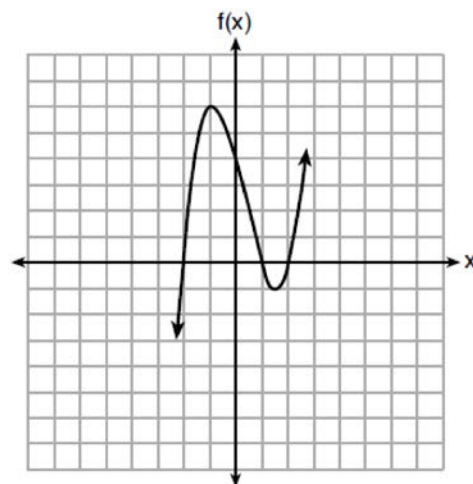
- 1)  $(x + 3)(x - 2)(x - 4)$
- 2)  $(x - 3)(x + 2)(x + 4)$
- 3)  $(x + 3)(x - 5)(x - 2)(x - 4)$
- 4)  $(x - 3)(x + 5)(x + 2)(x + 4)$

- 3 A cubic function is graphed on the set of axes below.



Which function could represent this graph?

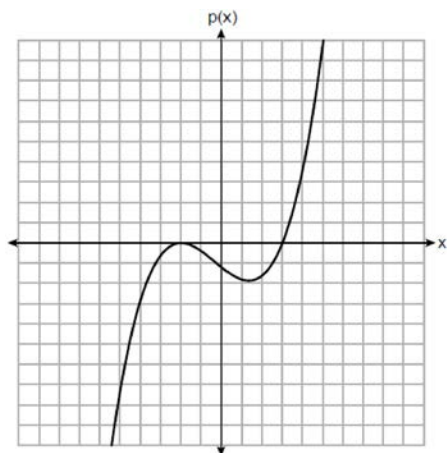
- 1)  $f(x) = (x - 3)(x - 1)(x + 1)$
  - 2)  $g(x) = (x + 3)(x + 1)(x - 1)$
  - 3)  $h(x) = (x - 3)(x - 1)(x + 3)$
  - 4)  $k(x) = (x + 3)(x + 1)(x - 3)$
- 4 A polynomial function is graphed below.



Which function could represent this graph?

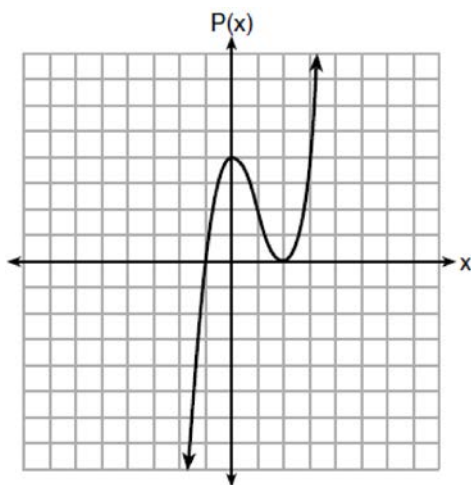
- 1)  $f(x) = (x + 1)(x^2 + 2)$
- 2)  $f(x) = (x - 1)(x^2 - 2)$
- 3)  $f(x) = (x - 1)(x^2 - 4)$
- 4)  $f(x) = (x + 1)(x^2 + 4)$

- 5 The graph of a cubic polynomial function  $p(x)$  is shown below.



If  $p(x)$  is written as a product of linear factors, which factor would appear twice?

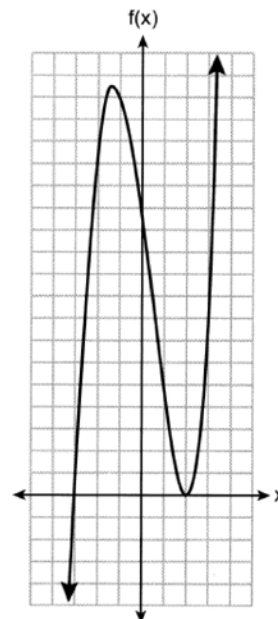
- 1)  $x - 2$
  - 2)  $x + 2$
  - 3)  $x - 3$
  - 4)  $x + 3$
- 6 Wenona sketched the polynomial  $P(x)$  as shown on the axes below.



Which equation could represent  $P(x)$ ?

- 1)  $P(x) = (x + 1)(x - 2)^2$
- 2)  $P(x) = (x - 1)(x + 2)^2$
- 3)  $P(x) = (x + 1)(x - 2)$
- 4)  $P(x) = (x - 1)(x + 2)$

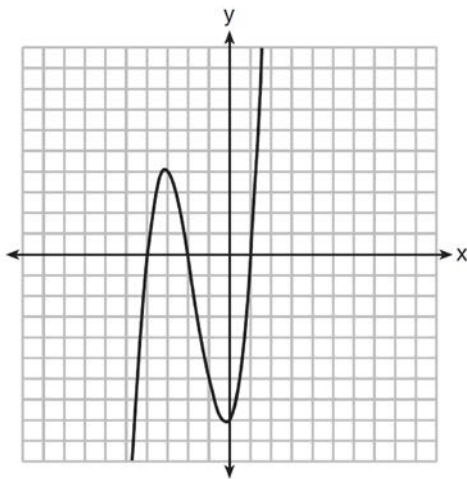
- 7 A function is graphed below.



A possible equation for this function is

- 1)  $f(x) = (x + 2)(x - 3)$
- 2)  $f(x) = (x - 2)(x + 3)$
- 3)  $f(x) = (x - 2)^2(x + 3)$
- 4)  $f(x) = (x - 2)(x + 3)(x - 12)$

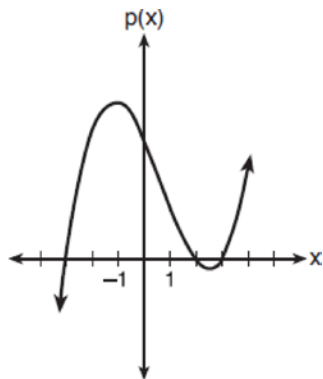
- 8 The graph of  $f(x)$  is shown below.



Which function could represent the graph of  $f(x)$ ?

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

- 9 The graph of the function  $p(x)$  is sketched below.

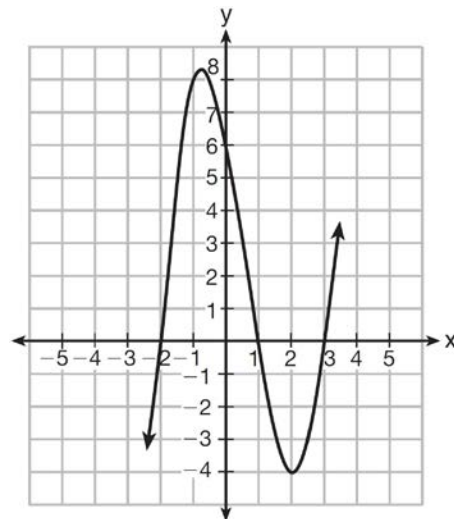


Which equation could represent  $p(x)$ ?

- 1)  $p(x) = (x^2 - 9)(x - 2)$
- 2)  $p(x) = x^3 - 2x^2 + 9x + 18$
- 3)  $p(x) = (x^2 + 9)(x - 2)$
- 4)  $p(x) = x^3 + 2x^2 - 9x - 18$

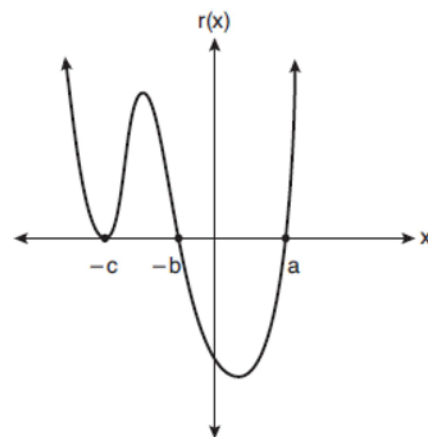
- 10 Which equation(s) represent the graph below?

- I  $y = (x + 2)(x^2 - 4x - 12)$
- II  $y = (x - 3)(x^2 + x - 2)$
- III  $y = (x - 1)(x^2 - 5x - 6)$



- 1) I, only
- 2) II, only
- 3) I and II
- 4) II and III

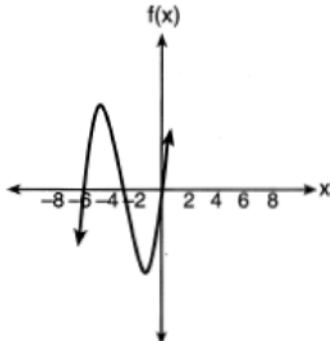
- 11 A sketch of  $r(x)$  is shown below.



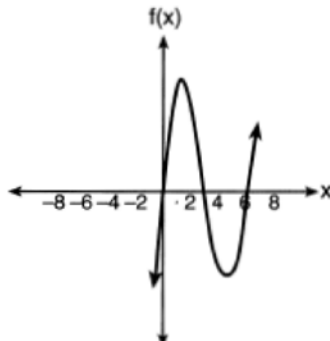
An equation for  $r(x)$  could be

- 1)  $r(x) = (x - a)(x + b)(x + c)$
- 2)  $r(x) = (x + a)(x - b)(x - c)^2$
- 3)  $r(x) = (x + a)(x - b)(x - c)$
- 4)  $r(x) = (x - a)(x + b)(x + c)^2$

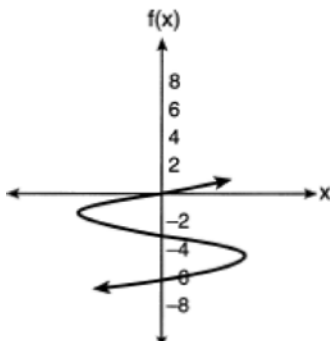
- 12 Which sketch represents the polynomial function  $f(x) = x(x+6)(x+3)$ ?



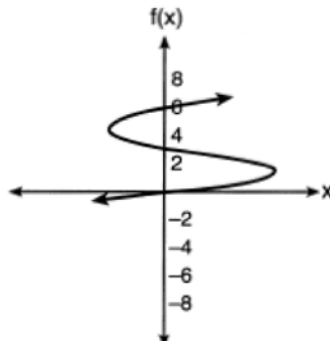
1)



2)

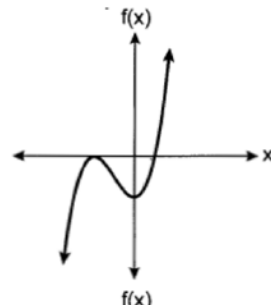


3)

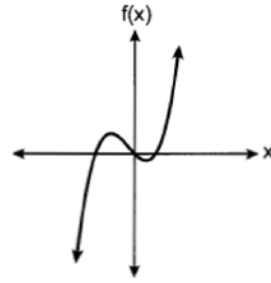


4)

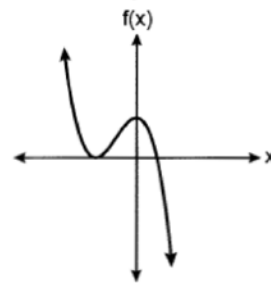
- 13 Which graph best represents the graph of  $f(x) = (x+a)^2(x-b)$ , where  $a$  and  $b$  are positive real numbers?



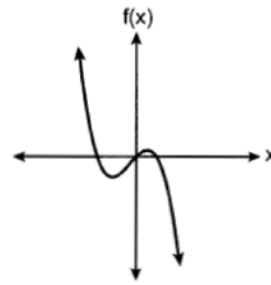
1)



2)

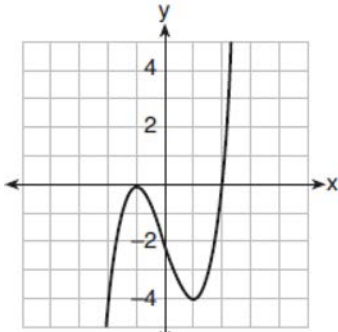


3)

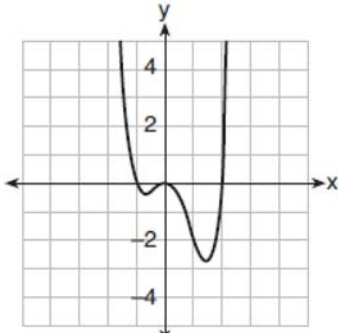


4)

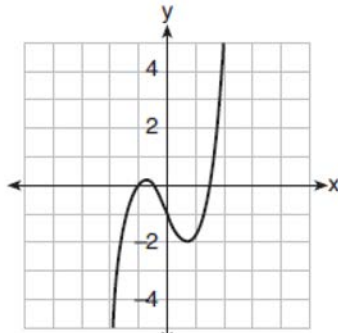
- 14 Which graph represents a polynomial function that contains  $x^2 + 2x + 1$  as a factor?



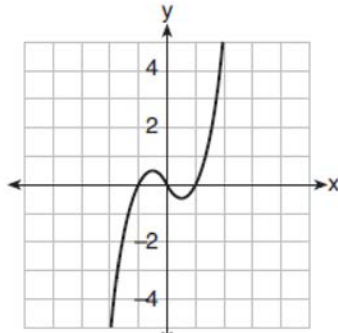
1)



2)

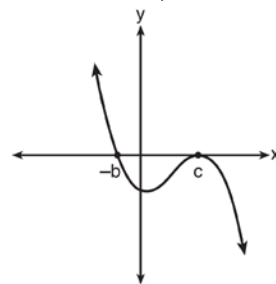


3)

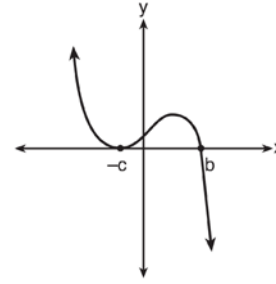


4)

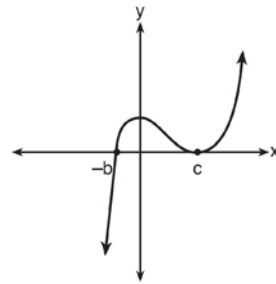
- 15 If  $a$ ,  $b$ , and  $c$  are all positive real numbers, which graph could represent the sketch of the graph of  $p(x) = -a(x+b)(x^2 - 2cx + c^2)$ ?



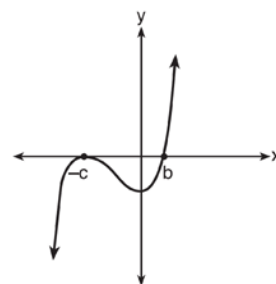
1)



2)



3)



4)

### A.APR.B.3: Graphing Polynomial Functions

#### Answer Section

1 ANS: 1 REF: 011524ai

2 ANS: 1 REF: 081623ai

3 ANS: 2 REF: 061818ai

4 ANS: 3

$$f(x) = (x - 1)(x^2 - 4) = (x - 1)(x - 2)(x + 2)$$

REF: 061908ai

5 ANS: 2 REF: 082324aii

6 ANS: 1 REF: 081707ai

7 ANS: 3 REF: 062310ai

8 ANS: 1

$$f(x) = (x + 2)(x + 4)(x - 1)$$

REF: 081504ai

9 ANS: 1 REF: 061701aii

10 ANS: 2

$$y = (x - 3)(x + 2)(x - 1)$$

REF: 061512ai

11 ANS: 4 REF: 061921aii

12 ANS: 1

The zeros of  $f$  are -6, -3 and 0.

REF: 062112ai

13 ANS: 1 REF: 012405aii

14 ANS: 1

$$x^2 + 2x + 1 = (x + 1)^2$$

REF: 011919aii

15 ANS: 1

The zeros of the polynomial are at  $-b$ , and  $c$ . The sketch of a polynomial of degree 3 with a negative leading coefficient should have end behavior showing as  $x$  goes to negative infinity,  $f(x)$  goes to positive infinity. The multiplicities of the roots are correctly represented in the graph.

REF: spr1501aii