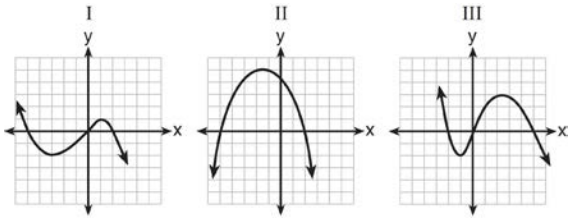
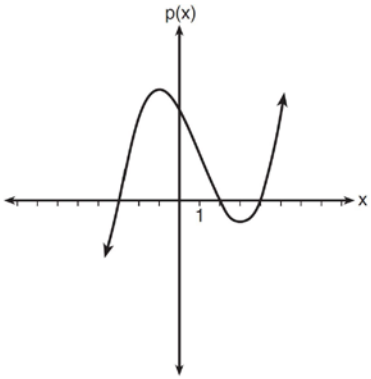
A.APR.B.3: Graphing Polynomial Functions 1

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



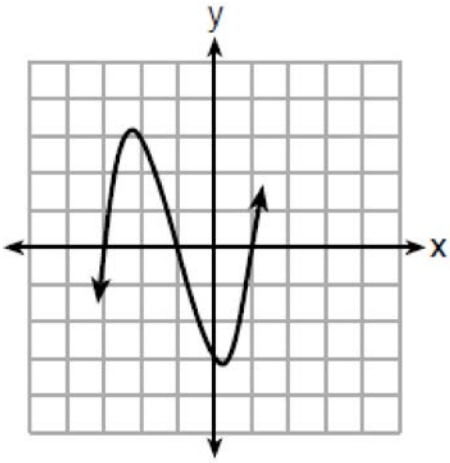
1) I, only
2) II, only
3) I and III
4) I, II, and III

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

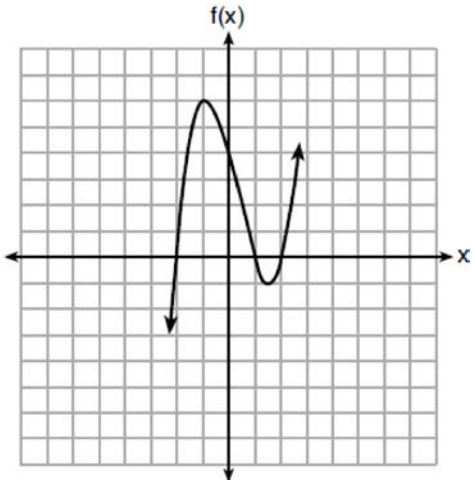
3 A cubic function is graphed on the set of axes below.



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) $k(x) = (x+3)(x+1)(x-3)$

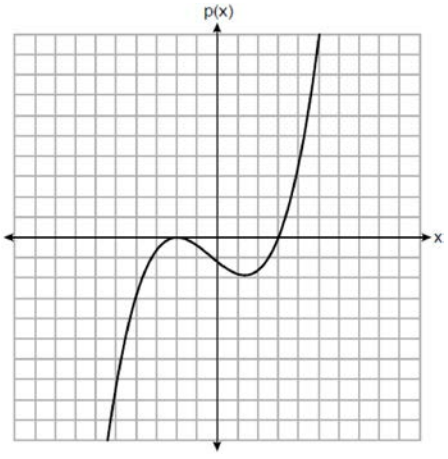
4 A polynomial function is graphed below.



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

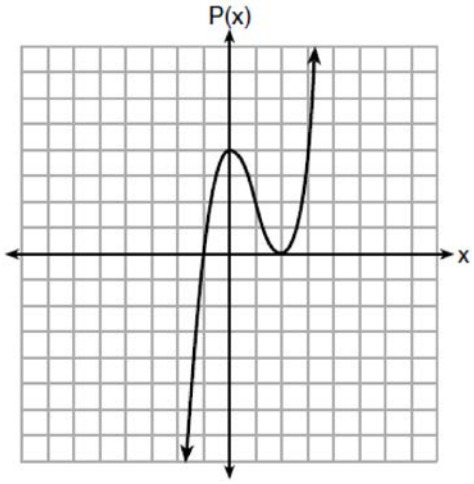
5 The graph of a cubic polynomial function $p(x)$ is shown below.



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) $x+3$

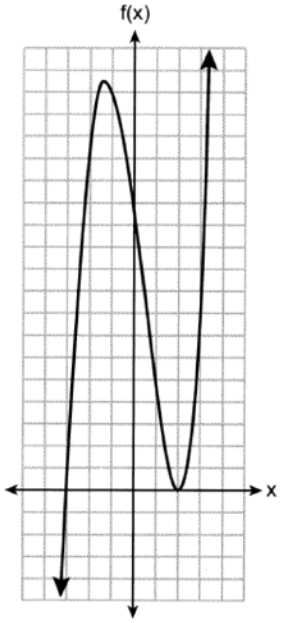
6 Wenona sketched the polynomial $P(x)$ as shown on the axes below.



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) $P(x) = (x-1)(x+2)$

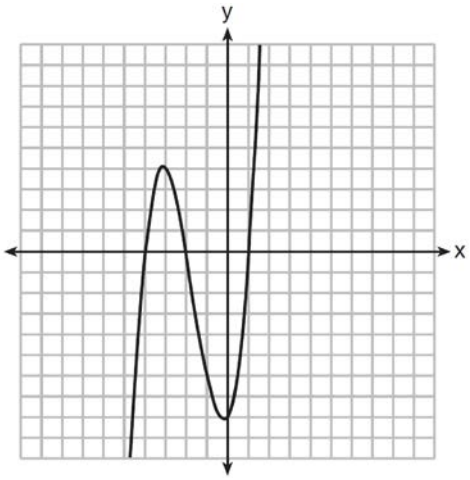
7 A function is graphed below.



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) $f(x) = (x-2)(x+3)(x-12)$

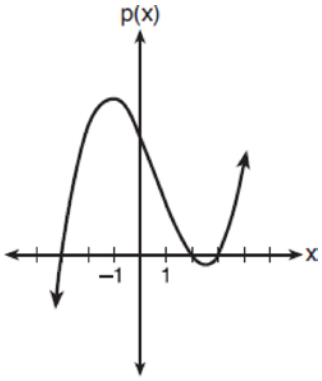
8 The graph of $f(x)$ is shown below.



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 $p(x)$?

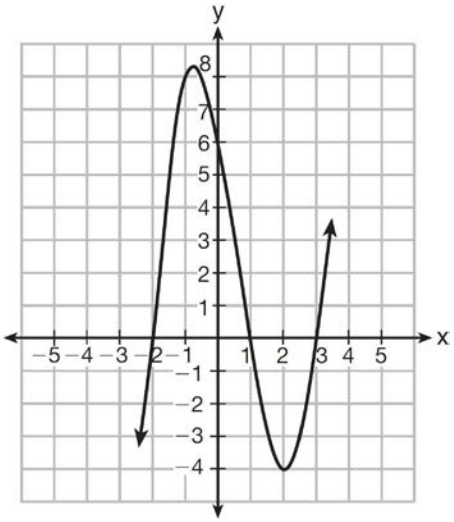
1) $p(x) = (x^2-9)(x-2)$
2) $p(x) = x^3-2x^2+9x+18$
3) $p(x) = (x^2+9)(x-2)$
4) $p(x) = x^3+2x^2-9x-18$

10 Which equation(s) represent the graph below?

I $y = (x+2)(x^2-4x-12)$

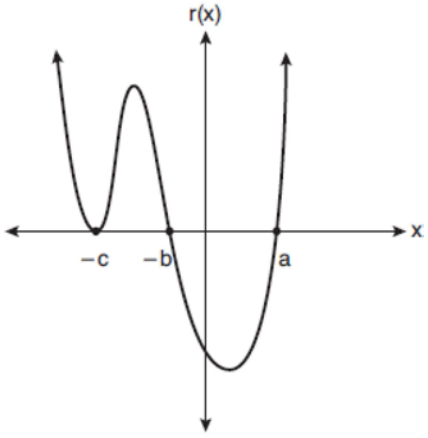
II $y = (x-3)(x^2+x-2)$

III $y = (x-1)(x^2-5x-6)$



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

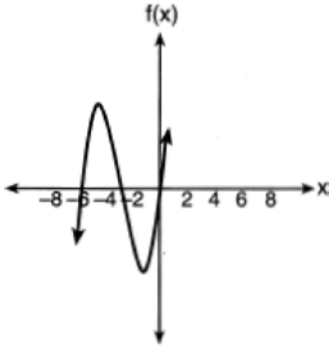
11 A sketch of $r(x)$ is shown below.

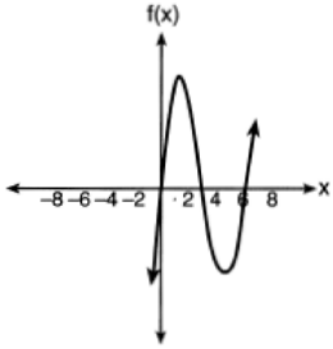


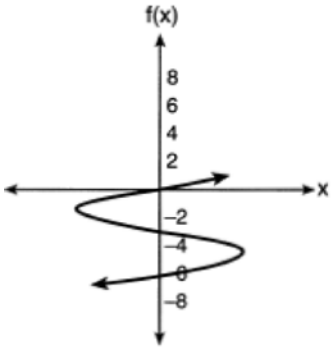
An equation for $r(x)$ could be

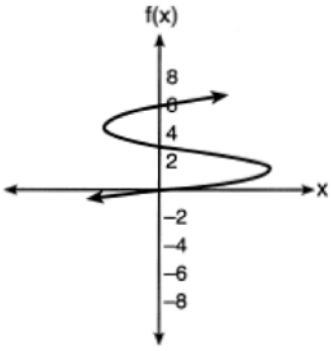
1) $r(x) = (x-a)(x+b)(x+c)$
2) $r(x) = (x+a)(x-b)(x-c)^2$
3) $r(x) = (x+a)(x-b)(x-c)$
4) $r(x) = (x-a)(x+b)(x+c)^2$

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

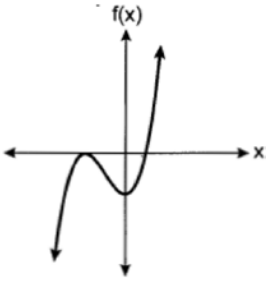
1)


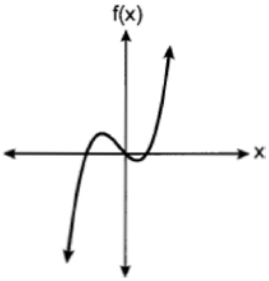
2)


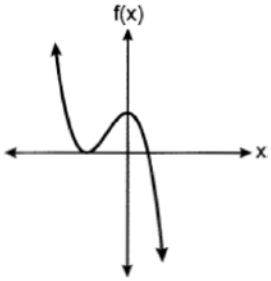
3)


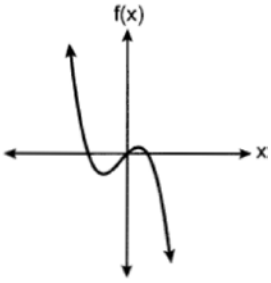
4)


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

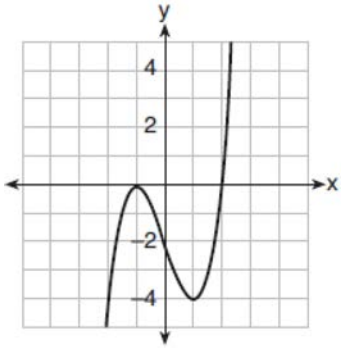
1)


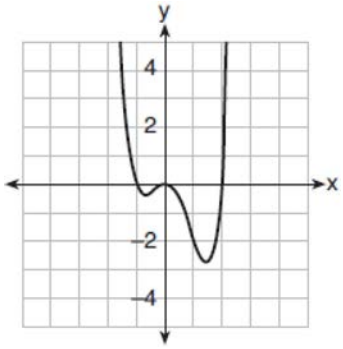
2)


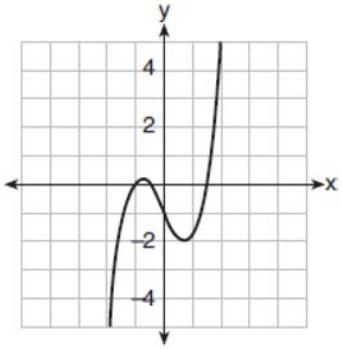
3)


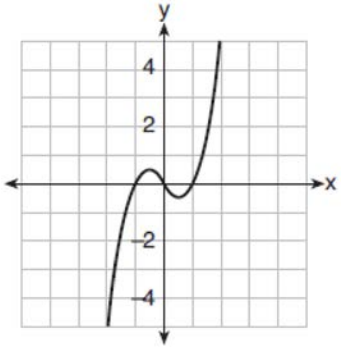
4)


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

1)


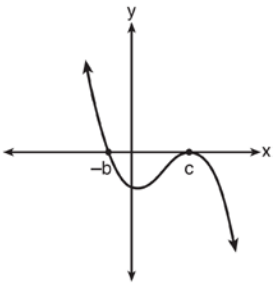
2)


3)


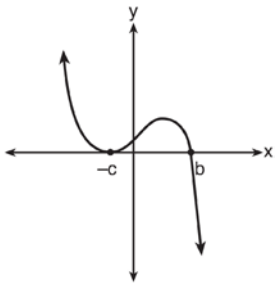
4)


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

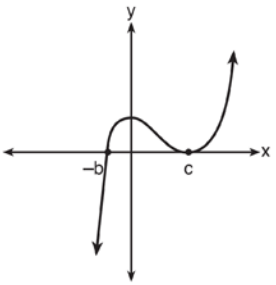
1)



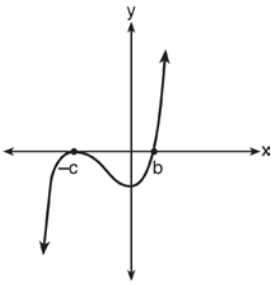
2)



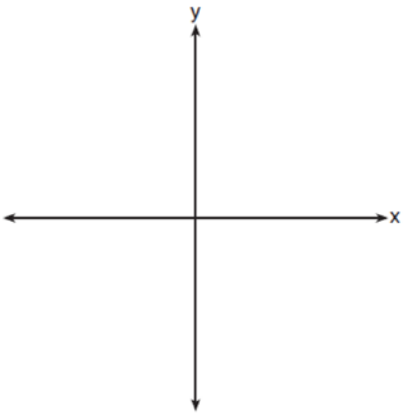
3)



4)



16 On the axes below, sketch a possible function $p(x) = (x-a)(x-b)(x+c)$, where a, b, and c are positive, $a > b$, and $p(x)$ has a positive y-intercept of d. Label all intercepts.



A.APR.B.3: Graphing Polynomial Functions 1
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
$y = (x-3)(x+2)(x-1)$

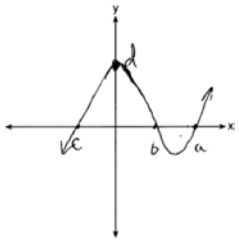
REF: 061512ai
11 ANS: 4 REF: 061921aii
12 ANS: 1
The zeros of f are -6, -3 and 0.

REF: 062112ai
13 ANS: 1 REF: 061921aii
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

16 ANS:



REF: 081732aii