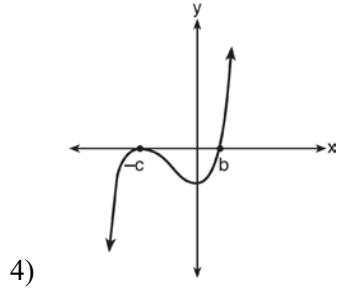
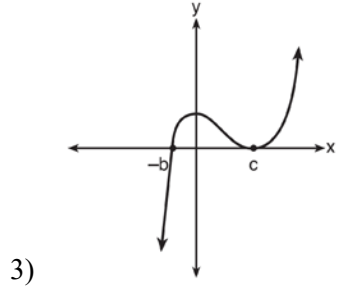
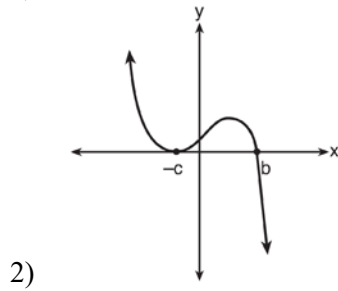
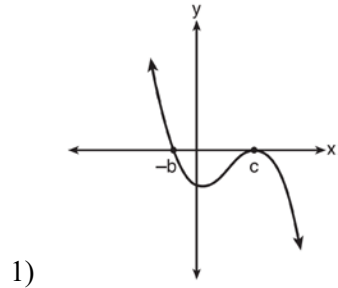


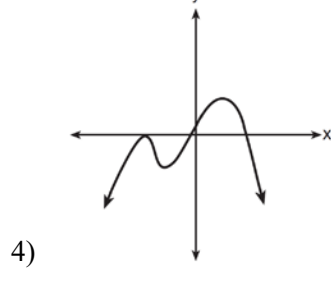
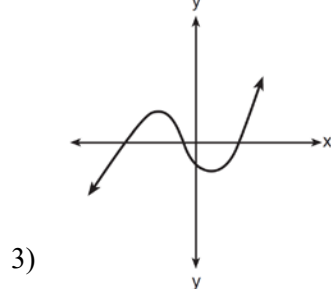
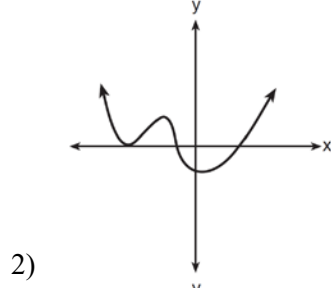
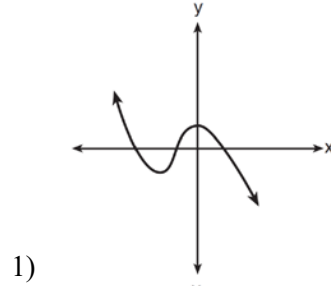
A.APR.B.3: Zeros of Polynomials 2

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

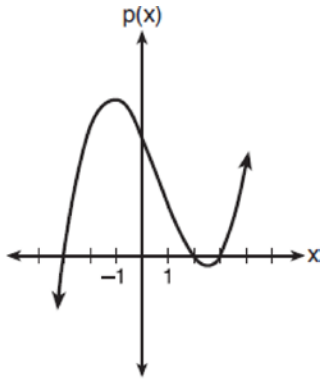


2 Which graph has the following characteristics?

- three real zeros
- as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$
- as $x \rightarrow \infty$, $f(x) \rightarrow \infty$



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

4 What are the zeros of $P(m) = (m^2 - 4)(m^2 + 1)$?

- 1) 2 and -2, only
- 2) 2, -2, and -4
- 3) -4, i , and $-i$
- 4) 2, -2, i , and $-i$

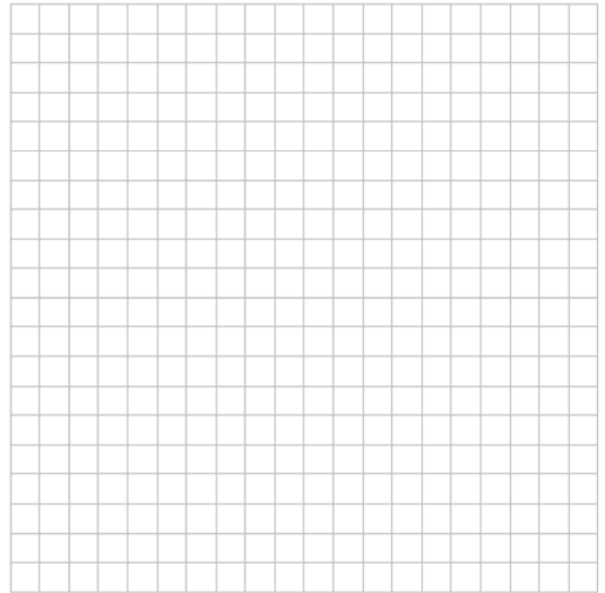
5 The zeros for $f(x) = x^4 - 4x^3 - 9x^2 + 36x$ are

- 1) $\{0, \pm 3, 4\}$
- 2) $\{0, 3, 4\}$
- 3) $\{0, \pm 3, -4\}$
- 4) $\{0, 3, -4\}$

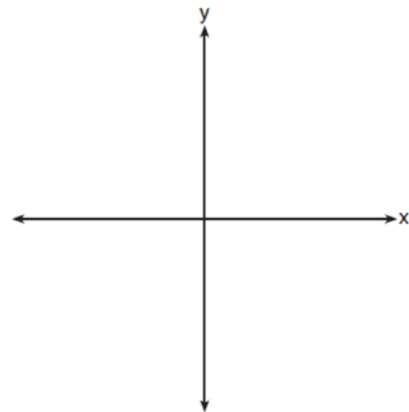
6 Form an equation whose roots are 2 and $-\frac{4}{3}$.

7 Form the equation whose roots are $\frac{1}{2}$ and $-\frac{1}{3}$.

8 On the grid below, sketch a cubic polynomial whose zeros are 1, 3, and -2.



9 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: Zeros of Polynomials 2

Answer Section

1 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

2 ANS: 3

The graph shows three real zeros, and has end behavior matching the given end behavior.

REF: 061604aii

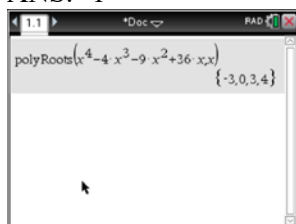
3 ANS: 1

REF: 061701aii

4 ANS: 4

REF: 081708aii

5 ANS: 1



$$x^4 - 4x^3 - 9x^2 + 36x = 0$$

$$x^3(x - 4) - 9x(x - 4) = 0$$

$$(x^3 - 9x)(x - 4) = 0$$

$$x(x^2 - 9)(x - 4) = 0$$

$$x(x + 3)(x - 3)(x - 4) = 0$$

$$x = 0, \pm 3, 4$$

REF: 061606aii

6 ANS:

$$3x^2 - 2x - 8 = 0$$

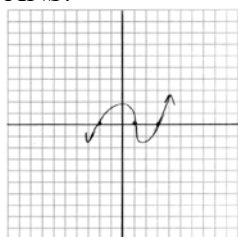
REF: 039112al

7 ANS:

$$6x^2 - x - 1 = 0$$

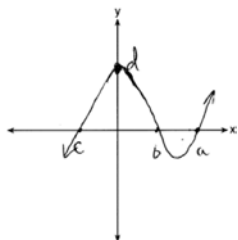
REF: 019311al

8 ANS:



REF: 011729a

9 ANS:



REF: 081732a