

Chapter 5 Review (Algebra 2)**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

What does Descartes' Rule of Signs tell you about the real roots of the polynomial?

- _____ 1. $-3x^3 + x^2 - x - 6 = 0$
- There is one positive root and either 2 or 0 negative roots.
 - There are either 2 or 0 positive roots and there are either 2 or 0 negative roots.
 - There is one positive root and one negative root.
 - There are either 2 or 0 positive roots and one negative root.
- _____ 2. Is $(x - 2)$ a factor of $P(x) = x^3 + 2x^2 - 6x - 4$? If it is, write $P(x)$ as a product of two factors.
- | | |
|---|---|
| a. yes:
$P(x) = (x + 2)(x^2 + 4x + 2)$ | c. $(x - 2)$ is not a factor of $P(x)$ |
| b. yes:
$P(x) = (x - 2)(x^2 + 4x + 2)$ | d. yes:
$P(x) = (x - 2)(x^2 - 4x + 2)$ |

Find all the zeros of the equation.

- _____ 3. $2x^4 - 5x^3 + 53x^2 - 125x + 75 = 0$
- | | |
|------------------------------|-------------------------------|
| a. $-1, -\frac{3}{2}, \pm 5$ | c. $1, \frac{3}{2}, \pm 5$ |
| b. $1, \frac{3}{2}, \pm 5i$ | d. $-1, -\frac{3}{2}, \pm 5i$ |
- _____ 4. What is a cubic polynomial function in standard form with zeros 5, 2, and -5 ?
- | | |
|-----------------------------------|-----------------------------------|
| a. $f(x) = x^3 + 2x^2 + 25x + 50$ | c. $f(x) = x^3 - 2x^2 - 25x + 50$ |
| b. $f(x) = x^3 + 2x^2 - 25x + 10$ | d. $f(x) = x^3 + 2x^2 + 17x + 50$ |
- _____ 5. Classify $-6x^5 + 4x^3 + 3x^2 + 11$ by degree.
- | | |
|--------------|------------|
| a. quintic | c. quartic |
| b. quadratic | d. cubic |
- _____ 6. Divide $-3x^3 - 2x^2 - x - 2$ by $x - 2$.
- | | |
|------------------------------|----------------------------|
| a. $-3x^2 - 8x - 17$ | c. $-3x^2 + 4x + 15$ |
| b. $-3x^2 - 8x - 17, R - 36$ | d. $-3x^2 + 4x + 15, R 32$ |

What are the zeros of the function? What are their multiplicities?

_____ 7. $f(x) = x^4 - 4x^3 + 3x^2$

- a. the numbers -1 and -3 are zeros of multiplicity 2; the number 0 is a zero of multiplicity 1
- b. the number 0 is a zero of multiplicity 2; the numbers -1 and -3 are zeros of multiplicity 1
- c. the numbers 0 and 1 are zeros of multiplicity 2; the number 3 is a zero of multiplicity 1
- d. the number 0 is a zero of multiplicity 2; the numbers 1 and 3 are zeros of multiplicity 1

Consider the leading term of each polynomial function. What is the end behavior of the graph?

_____ 8. $-3x^5 + 9x^4 + 5x^3 + 3$

- a. The leading term is $-3x^5$. Since n is odd and a is negative, the end behavior is up and down.
- b. The leading term is $-3x^5$. Since n is odd and a is negative, the end behavior is down and up.
- c. The leading term is $-3x^5$. Since n is odd and a is negative, the end behavior is up and up.
- d. The leading term is $-3x^5$. Since n is odd and a is negative, the end behavior is down and down.

Use Pascal's Triangle to expand the binomial.

_____ 9. $(d - 2)^6$

- a. $d^6 + 12d^5 + 60d^4 + 160d^3 + 240d^2 + 192d + 64$
- b. $d^6 + 6d^5 + 15d^4 + 20d^3 + 15d^2 + 6d + 1$
- c. $d^6 - 6d^5 + 15d^4 - 20d^3 + 15d^2 - 6d + 1$
- d. $d^6 - 12d^5 + 60d^4 - 160d^3 + 240d^2 - 192d + 64$

Find the roots of the polynomial equation.

_____ 10. $x^3 - 2x^2 + 10x + 136 = 0$

- a. $-3 \pm 5i, -4$
- b. $3 \pm i, 4$
- c. $-3 \pm i, 4$
- d. $3 \pm 5i, -4$

_____ 11. Find the rational roots of $x^4 + 8x^3 + 7x^2 - 40x - 60 = 0$.

- a. $-6, 2$
- b. $-6, -2$
- c. $2, 6$
- d. $-2, 6$

_____ 12. Find a quadratic equation with roots $-1 + 4i$ and $-1 - 4i$.

- a. $x^2 - 2x - 17 = 0$
- b. $x^2 - 2x + 17 = 0$
- c. $x^2 + 2x - 17 = 0$
- d. $x^2 + 2x + 17 = 0$

Write the polynomial in factored form.

- _____ 13. $x^3 + 9x^2 + 18x$
 a. $x(x+6)(x-3)$ c. $3x(x+6)(x+1)$
 b. $6x(x+1)(x+3)$ d. $x(x+3)(x+6)$
- _____ 14. $4x^3 + 8x^2 - 96x$
 a. $4x(x-4)(x+6)$ c. $4x(x+6)(x+4)$
 b. $-4x(x+6)(x+4)$ d. $6x(x+4)(x-4)$

Use the Binomial Theorem to expand the binomial.

- _____ 15. $(d-3b)^3$
 a. $d^3 - 9d^2b + 27db^2 - 27b^3$
 b. $d^3 - 3d^2b + 3db^2 - b^3$
 c. $d^3 + 3d^2b + 3db^2 + b^3$
 d. $d^3 + 9d^2b + 27db^2 + 27b^3$
- _____ 16. Divide $4x^3 + 2x^2 + 3x + 4$ by $x + 4$.
 a. $4x^2 + 18x - 53$, R 240 c. $4x^2 - 14x + 59$
 b. $4x^2 - 14x + 59$, R -232 d. $4x^2 + 18x - 53$

What are the real or imaginary solutions of the polynomial equation?

- _____ 17. $x^3 = 216$
 a. $6, -3 + 3i\sqrt{3}$, and $-3 - 3i\sqrt{3}$ c. $-6, 3 + 3i\sqrt{3}$, and $3 - 3i\sqrt{3}$
 b. $6, 3 + 3i\sqrt{7}$, and $3 - 3i\sqrt{7}$ d. $-6, 3 + 3i\sqrt{7}$, and $3 - 3i\sqrt{7}$

What is the equation of $y = x^3$ with the given transformations?

- _____ 18. horizontal translation right 10 units and vertical translation down 12 units
 a. $y = (x - 12)^3 + 10$ c. $y = (x + 12)^3 + 10$
 b. $y = (x + 10)^3 - 12$ d. $y = (x - 10)^3 - 12$

What are the real or imaginary solutions of each polynomial equation?

- _____ 19. $x^4 - 40x^2 + 144 = 0$
 a. $6, -6$ c. $6, -2$
 b. $6, -6, 2, -2$ d. no solution
- _____ 20. A polynomial equation with rational coefficients has the roots $3 + \sqrt{6}$, $2 - \sqrt{5}$. Find two additional roots.
 a. $6 - \sqrt{3}$, $5 + \sqrt{2}$ c. $3 - \sqrt{6}$, $2 + \sqrt{5}$
 b. $6 + \sqrt{3}$, $5 - \sqrt{2}$ d. $3 + \sqrt{6}$, $2 - \sqrt{5}$