College Prep Algebra
Chapter 3 Practice Test

Answer the following.

1. Use long division to divide the first polynomial by the second.
$x^4 - 2x^3 - 9x^2 + 15x - 11 \div x + 3.$

A. $x^3 + x^2 - 6x + 33 - \frac{110}{x+3}$
B. $x^3 - 5x^2 - 6x - 40 - \frac{188}{x+3}$
C. $x^3 - x^2 + 6x - 23 - \frac{27}{x+3}$
D. $x^3 - 5x^2 + 6x - 3 + \frac{-2}{x+3}$

2. Use synthetic division to determine which of the following values is a zero of
$4x^4 + 29x^3 + 28x^2 - 19x - 42.$

A. 3
B. 5
C. -6
D. -7

3. Use Synthetic Division and the Factor Theorem to determine whether or not $x + 1$ is a factor of
$f(x) = x^3 + 3x^2 - 7x - 8.$

A. Yes
B. No

4. Use Synthetic Division to determine whether or not -6 is a zero of
$h(x) = x^3 + 4x^2 - 17x - 30.$

A. Yes
B. No

5. Use synthetic division to divide the first polynomial by the second.
$2x^3 - x^2 - 3x + 8 \div x - 2.$

A. $2x^2 - 5x + 7 - \frac{6}{x-2}$
B. $2x^2 - 4x - 24$
C. $2x^2 + 3x + 3 + \frac{14}{x-2}$
D. $2x^2 + 3x + 9$

6. Examine the leading term and determine the far-left and far-right behavior of the graph of the polynomial function $f(x) = -3x^5 - 8x^4 - 10x^3 + 4.$

A. up to the far left, up to the far right
B. up to the far left, down to the far right
C. down to the far left, up to the far right
D. down to the far left, down to the far right

7. Examine the leading term and determine the far-left and far-right behavior of the graph of the polynomial function $f(x) = 3x^6 - 12x^2 + 9x + 17$.

A. up to the far left, up to the far right
B. up to the far left, down to the far right
C. down to the far left, up to the far right
D. down to the far left, down to the far right

8. Find the zeros of the polynomial function $p(x) = (x+1)^2(x-4)$ and state the multiplicity of each zero.

A. -1, -4 (mult of 2)
B. -1 (mult of 2), 4
C. -1, 4 (mult of 2)
D. -1 (mult of 2), -4

9. Find the zeros of the polynomial function $h(x) = x^3 + x^2 - 8x - 12$. If a zero is a multiple zero, state its multiplicity.

A. -2, 3, -1
B. -2 (*mult* 2), 3, -1 (*mult* 2)
C. -2 , 3 (*mult* 2), -1
D. -2 (*mult* 2), 3

10. Find the zeros of the polynomial function $f(x) = x^4 - 6x^3 + 10x^2 - 6x + 9$. If a zero is a multiple zero, state its multiplicity.

A. $\pm i, 2\ (mult\ 2)$
B. $\pm i, -2 (mult\ 2)$
C. $\pm i, 3\ (mult\ 2)$
D. $\pm i, -3\ (mult\ 2)$

11. Use the Rational Root Theorem to list all possible rational zeros of the polynomial function $p(x) = 3x^3 + 5x^2 + 7x - 6$

A. $\pm 1, \pm 2, \pm 3, \pm 6$
B. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{5}{3}$
C. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}$
D. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{2}, \pm \frac{3}{3}, \pm \frac{6}{3}$

12. Use the Rational Root Theorem to list all possible rational zeros of the polynomial function $p(x) = x^3 - 3x^2 - 10x + 24$.

A. $\pm 1, \pm 3, \pm 6, \pm 8, \pm 24$
B. $\pm 1, \pm 3, \pm 8, \pm 24$
C. $\pm 1, \pm 2, \pm 4, \pm 6, \pm 24$
D. $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm 24$

13. Use Descartes' Rule of Signs to state the number of possible positive, negative, and imaginary zeros of the polynomial function $g(x) = 3x^6 - 5x^5 + 9x^4 + 5x^3 + 7x^2 - 2x - 13$.

A. 3 or 1(+), 3 or 1(-), 0, 2, or 4(i)
B. 3 or 1(+), 2 or 0(-), 1 or 3(i)
C. 2 or 0(+), 2 or 0(-), 2, 4 or 6(i)
D. 4, 2, or 0(+), 2 or 0(-), 3 or 1(i)

14. Use Descartes' Rule of Signs to state the number of possible positive, negative, and imaginary zeros of the polynomial function $g(x) = x^5 - 14x - 16$.

A. 3 or 1(+), 2 or 0(-), 3 or 1(i)
B. 2 or 0(+), 1(-), 3 or 1(i)
C. 1(+), 2 or 0(-), 3 or 1(i)
D. 1(+), 2 or 0(-), 2 or 4(i)

15. Find all the zeros of the polynomial function $g(x) = x^3 - 7x^2 + 32x - 60$ and write the polynomial as a product of its linear factors.

A. $-1, 3 \pm 2i;\ g(x) = (x+1)(x-(3+2i))(x-(3-2i))$
B. $3, 2 \pm 4i;\ g(x) = (x-3)(x-(2+4i))(x-(2-4i))$
C. $-3, 2 \pm 2i;\ g(x) = (x+3)(x-(2+4i))(x-(2-4i))$
D. $-2, -2 \pm 3i;\ g(x) = (x+2)(x-(-2+3i))(x-(-2-3i))$

16. Graph the polynomial $p(x) = x^3 - 7x^2 + 11x - 1$. Estimate, to the nearest tenth, the coordinates of the points where *p(x)* has a relative maximum or a relative minimum. For each point, indicate whether the *y* value is a relative maximum or a relative minimum.

A. *p(x)* has a relative maximum of 1 at 4 and a relative minimum of 3.7 at -5.5.
B. *p(x)* has a relative maximum of 4 at 1 and a relative minimum of -5.5 at 3.7.
C. *p(x)* has a relative maximum of 1.06 at 3.96 and a relative minimum of 3.54 at -5.33.
D. *p(x)* has a relative maximum of 3.96 at 1.06 and a relative minimum of -5.33 at 3.54.

17. Find the horizontal asymptote of the rational function $f(x) = \frac{4x^3+3x^2+10x+15}{8x^4+7x+13}$.

A. $y = 4$
B. $y = \frac{1}{2}$
C. $y = 2$
D. $y = 0$

18. Determine the vertical and horizontal asymptotes of the rational function $h(x) = \frac{x-3}{x+5}$.

A. $x = -5, y = 0$
B. $x = -5, y = 1$
C. $x = 3, y = 0$
D. $x = 3, y = 1$

19. Determine the slant asymptote of the rational function $f(x) = \frac{x^3+5x^2+105x-150}{x^2-x-35}$.

A. $y = x + 6$
B. $y = x - 3$
C. $y = x - 4$
D. $y = x + 5$

20. Find all the vertical asymptotes of the rational function $f(x) = \frac{3x^2+6}{x^2-2x-24}$.

A. $x = -3, x = 1$
B. $x = -2, x = 2$
C. $x = -4, x = 6$
D. $x = 4, x = -6$

21. Determine the vertical and slant asymptotes of the rational function $f(x) = \frac{x^3+3x^2+2x-1}{x^2-4}$.

A. $x = -1, x = 1, y = x + 2$
B. $x = -4, x = 4, y = x + 3$
C. $x = -2, x = 2, y = x + 3$
D. $x = -8, x = 8, y = x + 2$

22. Find a polynomial function *p* of degree 3 with interval coefficients that has zeros $7 - 2i$ and -3.

A. $p(x) = x^3 - 14x^2 + 9x + 178$
B. $p(x) = x^3 + 13x^2 + 24x - 216$
C. $p(x) = x^3 - 12x^2 - 27x + 176$
D. $p(x) = x^3 - 11x^2 + 11x + 159$

23. Find a polynomial function of lowest degree with integer coefficients that has zeros 2, -3, and -4.

A. $f(x) = x^3 + 5x^2 - 2x - 24$
B. $f(x) = x^3 + 3x^2 - 9x + 32$
C. $f(x) = x^3 - 2x^2 + 6x - 3$
D. $f(x) = x^3 + 4x^2 - 3x + 1$