

Name: \_\_\_\_\_

**College Algebra: Review (Test 3)**

---

1. Find all solutions of the following equation.

$$x^3 + 5x^2 - 24x = 0$$

2. Find all solutions of the following equation.

$$2x^4 - 13x^2 + 15 = 0$$

3. Compute the following product.

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

4. Fill in the boxes to describe the long-term behavior of the following polynomial.

$$p(x) = 2x^4 + 5x^2 - 3$$

.

As  $x \rightarrow \infty$ ,  $p(x) \rightarrow$  , and as  $x \rightarrow -\infty$ ,  $p(x) \rightarrow$

5. Fill in the boxes to describe the long-term behavior of the following polynomial.

$$p(x) = -4x^5 - 12x^3 - 3x + 2$$

.

As  $x \rightarrow \infty$ ,  $p(x) \rightarrow$  , and as  $x \rightarrow -\infty$ ,  $p(x) \rightarrow$

6. Use synthetic division to find the quotient and remainder when

$$a(x) = x^5 - 6x^4 + 10x^3 - 11x + 6$$

is divided by  $b(x) = x + 1$ .

7. Find the list of candidate roots of the polynomial

$$p(x) = 2x^3 + 3x^2 + 6x + 4$$

given by the Rational Root Theorem. **Do not factor.**

8. Construct a polynomial of degree 3 which has roots at -1, -2, and 1.

9. Construct a polynomial having roots at -4, 5, and 3.

10. Construct a polynomial having roots at 5, 3, and  $1/2$ .

11. The polynomial

$$p(x) = x^5 - 17x^3 - 12x^2 + 52x + 48$$

has roots at  $4; -1; 2; -2$ . Completely factor  $p(x)$  as a product of linear factors.

12. The polynomial

$$p(x) = 2x^5 - x^4 - 27x^3 - 11x^2 + 25x + 12$$

has roots at  $-1; 1; 4$ . Completely factor  $p(x)$  as a product of linear factors.

13. The polynomial

$$p(x) = x^7 - 10x^6 + 42x^5 - 96x^4 + 129x^3 - 102x^2 + 44x - 8$$

has roots at 1 and 2. Find the multiplicity of these roots.

14. Factor the following polynomial.

$$p(x) = 4x^4 - 15x^2 - 5x + 6$$