Practice

The Remainder and Factor Theorems

Divide using synthetic division.
1. \((3x^2 + 4x - 12) \div (x + 5)\)
2. \((x^2 - 5x - 12) \div (x - 3)\)

3. \((x^4 - 3x^2 + 12) \div (x + 1)\)
4. \((2x^3 + 3x^2 - 8x + 3) \div (x + 3)\)

Use the Remainder Theorem to find the remainder for each division.
State whether the binomial is a factor of the polynomial.
5. \((2x^4 + 4x^3 - x^2 + 9) \div (x + 1)\)
6. \((2x^3 - 3x^2 - 10x + 3) \div (x - 3)\)

7. \((3t^2 - 10t^2 + t - 5) \div (t - 4)\)
8. \((10x^3 - 11x^2 - 47x + 30) \div (x + 2)\)

9. \((x^4 + 5x^3 - 14x^2) \div (x - 2)\)
10. \((2x^4 + 14x^3 - 2x^2 - 14x) \div (x + 7)\)

11. \((y^3 + y^2 - 10) \div (y + 3)\)
12. \((n^4 - n^3 - 10n^2 + 4n + 24) \div (n + 2)\)

13. Use synthetic division to find all the factors of \(x^3 + 6x^2 - 9x - 54\).
    If one of the factors is \(x - 3\).

14. **Manufacturing**  A cylindrical chemical storage tank must have
    a height 4 meters greater than the radius of the top of the tank.
    Determine the radius of the top and the height of the tank if the
    tank must have a volume of 15.71 cubic meters.