Synthetic Substitution

a) Use synthetic substitution to find the value of the function:

    1. if $f(x) = x^3 - 6x^2 + 11x - 6,$ determine $f(-3), f(-1), f(2),$ and $f(4)$

    2. if $g(x) = 2x^5 - 3x^4 + 2x^2 - x + 8,$ determine $g(-3), g(-1), g(3),$ and $g(5)$

    3. if $P(x) = x^5 - 10x^4 + 20x^3 - 5x - 100,$ determine $P(-4)$ and $P(6)$

b) Use synthetic substitution to determine whether or not the given factors are a factor of the given polynomial function.

    1. $P(x) = 3x^4 - 11x^3 + 10x - 4,$ $(x+1)$ and $(3x-2)$

    2. $f(x) = x^3 + 6x^2 + x + 6,$ $(x-1)$ and $(x+6)$

    3. $g(x) = 5x^4 - 4x^3 + 19x^2 - 16x - 4,$ $(x-1)$ and $(x-7)$

    4. $h(x) = x^5 - 5x^4 + 5x^3 + 15x^2 - 36x + 20,$ $(x+1)$ and $(x+2)$

c) Use the Factor Theorem to determine the possible rational roots of the following polynomial functions.

    1. $f(x) = x^4 + 2x^3 + 2x^2 - 4x - 8$

    2. $P(x) = x^3 + 7x^2 + 4x + 28$

    3. $g(x) = x^5 - 3x^2 + 1$

    4. $h(x) = 3x^4 - 4x^3 + x^2 + 6x - 2$

    5. $f(x) = 15x^6 + 47x^2 + 2$

    6. $g(x) = 6x^3 + 12x^2 + 5x - 3$

d) Use the Factor Theorem and synthetic substitution to determine the roots of the following polynomial functions.

    1. $f(x) = x^3 + 3x^2 - x - 3$

    2. $g(x) = x^3 + 5x^2 - x - 5$

    3. $h(x) = 2x^3 + 3x^2 + 2x + 3$

    4. $P(x) = x^3 + 6x^2 + x + 6$

    5. $f(x) = 3x^3 + 11x^2 - 2x + 8$

    6. $g(x) = x^4 + x^3 - 13x^2 - x + 12$

    7. $h(x) = 3x^4 + x^3 - 13x^2 - x + 12$