

Quadratic Equation Problems

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1. Factor the expression

$$6(a^2 + b^2 + c^2) + 13ab + 15bc + 20ca.$$

2. Solve the equation $\sqrt{5-x} = 5-x^2$.
3. Find all pairs of integers (x, y) such that $x^3 + y^3 = (x+y)^2$.
4. Let a be a real number. Solve the equation $x^4 + x^3 - 2x^2 - 3ax - a^2 = 0$ for x .
5. Find the range of the function $f(x) = \sqrt{x^2 + x + 1} - \sqrt{x^2 - x + 1}$.