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Assignment 7

1. Prove: If n = 25, 100, or 169, then n is a perfect square and is the sum of two perfect squares. Indicate which method of proof you used.

Assume n = c^2, if n = 25 then c = 5, if n = 100 then c = 10, if n = 169 then c = 13.

If c^2 is the sum of a perfect square then we can represent it as c^2 = a^2 + b^2.

Under this, the 3-4-5 Pythagorean triple proves this statement for n = 25.

100 = a^2 + b^2, 9 is 3^2 which is a perfect square and 81 is 9^2 which is a perfect square, and their sum is 100.

169 is a perfect square (13^2 = 169), 25 is 5^2 which is a perfect square and 144 is 12^2 which is a perfect square, 25 + 144 = 169 which prove the statement.

Direct Proof

2. Prove: The sum of two odd integers is even. Hint: By definition, even integers can be expressed as 2n, thus odd integers can be expressed as 2n + 1

(2n + 1) + (2m + 1)

2n + 2m + 2

2(n + m) + 2

Let j = n + m

2j + 2 = 2(j + 1) let j + 1 = k, 2k is the definition of an even number Direct Proof

3. Prove: The sum of an even integer and it's square is even

2n is the definition of an even number

2(2n\*n) is a way of showing an even number squared.

2n + 2(2n\*n) = 2(2n\*n + n)

Let 2n\*n + n = k

2k is even by definition

4. Prove by Contradiction: If n squared is odd, then n is odd

n^2 is odd -> n is not odd

(2k + 1)^2 -> 2k +1 is not odd, contradiction because 2k + 1 is definition of odd number

n^2 is odd -> n is odd