Minh Nguyen

4/8/2014

CS 225

Asn 2.1 (7th edition) 1.7: # 2, 4, 6, 14, 16

2) Use a direct proof to show that the sum of two even integers is even.

Let T_1 and T_2 be two even integers. $T_1 = 2k_1$ and $T_2 = 2k_2$ if we follow the definition of even numbers. k_1 and k_2 are also integers. Then $T_1 + T_2$ can be shown as $2k_1 + 2k_2$, or $2 (k_1 + k_2)$. Our definition of even numbers then tell us that $T_1 + T_2$ is in fact, even.

4) Show that the additive inverse, or negative, of an even number is an even number using a direct proof.

Let m be an even number. The definition of even numbers is m=2k, where k is also an integer. -m is then written as -m = -2k. -2k = 2 * (-k). By the definition of even number, -m is also an even number.

6) Use a direct proof to show that the product of two odd numbers is odd.

let n and m be two odd numbers. By definition of odd numbers, n = 2k + 1, m = 2j + 1, where k and j are integers. n *m is then written as nm = (2k + 1) *(2j + 1), then we can expand this into 4kj + 2k + 2j + 1. Then we can factor out like so: 2(2kj + k + j) + 1. Which goes by the definition of odd numbers, concluding that n*m is an odd number

14) prove that if x is rational and x ≠ 0, then 1/x is rational.

Since we know x is rational, using the definition of rational numbers, p and q are integers where q ≠ 0, and x = p/q. so 1/x = q / p, by inverse of division. Since x ≠ 0, then it follows that p ≠ 0, and so by definition of rational numbers, 1/x is rational.

16) Prove that if m and n are integers and mn are even, then m is even or n is even (use contrapositive)

Let p -- > q mean that p is the proposition that "m and n are integers and mn is even", and q is the statement "m is even or n is even". Using the contrapositive of this problem, and by the definition of even integers, if m is not even, or n is not even, then mn cannot be even. Since The contrapositive of the original is true, then the original is true.