MAT 243 Online Written Homework Assignments for Week 2 (units 4-5)

1. Let p = “All the people”, the universe of discourse

Let k(x) = “x is a kid”, the predicate

Let i(x) = “x likes ice cream”, the predicate.

, premise.

, premise.

, Modus Tollens

1. Let s and t be odd numbers

By definition of an odd number, s = (2m + 1) and t =(2n + 1) where

Then the product is (2m + 1) (2n + 1) = (4mn + 2m + 2n + 1)

It is followed that the product of = (N + 1), where N = (4mn+2m+2n) is not an odd number.

Thus, the product is an odd number.

1. Let p = 2 and q = 10 be two natural numbers.

By definition, A *natural number* is a positive integer: 1,2, 3, etc.

If (q – p) > 1, then there exists a natural number between p and q.

It is followed that (10 – 2) = 8 and 8 > 1, therefore there exists a natural number between 2 and 10.

1. Let where x is not an even number.

By definition of even number,

Then, squaring both side yields

Followed by , or

is even, x must also be even. Thus cannot be expressed as a rational number, so is an irrational number whose square is 10.

It is concluded that there is no natural number whose square is 10.

1. Let p be an even number and q be an odd number.

By definition of an even number, p = 2n where n is any natural number, and by definition of an odd number, q = (2m + 1) where m is any natural number.

Then, q + q = (2m + 1) + (2m + 1) = (4m + 2) = 2(2m + 1) = 2n where n = (2m + 1). Thus,

P = (q + q), concluding that every even number can be written as the sum of two odd numbers.

1. Let s and t be real numbers and t > s.

By definition of real numbers, if s and t are real integers, then so are (s + t) and where

If (t – s) > 0 then there exists a real number between s and t.

Thus, there exists a real number between s and t.