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Math 301

HW 3

|  |  |  |  |
| --- | --- | --- | --- |
| P | Q | P->Q | ~(P->Q) |
| T | T | T | F |
| T | F | F | T |
| F | T | T | F |
| F | F | T | F |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | ~P | ~Q | P->~Q | Q->~P |
| T | T | F | F | F | F |
| T | F | F | T | T | T |
| F | T | T | F | T | T |
| F | F | T | T | T | T |

It appears share the truth value for the same P and Q values. Therefore, are logically equivalent.

1. and P is false
2. is false as P is false, so () is false. The only possible way it could be false is when R is true and S is false. R=true, S=false
3. could be either true or false since truth value of Q does not matter.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P | Q | (P) | (~P) | ~Q |  |
| T | T | T | F | F | T |
| T | F | F | F | T | T |
| F | T | T | T | F | F |
| F | F | T | T | T | T |

When P is false and Q is true, the inference does not work. Therefore, the inference is not valid.

1. a. For all real number r, .
2. There is an integer n which is bigger than 0 and smaller than 1.
3. For all real number x and y,.
4. There exists rational number q such that every rational number r, multiplication of q and r is equal to zero.
5. For all positive rational number r, there is a positive rational number q such that .
6. For all sets X in powerset of W, cardinality of X is in W.
7. a. Every non-negative real number has a square root

, ,.

b. The sine of any real number is between -1 and 1, inclusive

1. There are two integers such that the square of the first is the cube of the second

.

1. For every integer 𝑛 where 𝑛 ≥ 2, there is a prime number between 𝑛 and 2n
2. The tangent of every nonzero rational number is not rational
3. The cardinality of every finite set of integers is less than that of its power set
4. a. Every rational number has a rational square

negation: There is rational number that has no rational square

b. There is a real number whose square is negative

negation: For all real number, its square is not negative

c. For every integer there is a larger integer

negation: There is an integer that has no larger integer

d. The cube of every integer is positive

negation: There is an integer that its cube is not positive

1. a.

negation:

b.

negation:

c.

negation:

d.

negation:

e.

negation: