Foundations of Mathematics Math 300 Sections 902, 905

20 August 2020 Class worksheet

Answers to Concept Quiz 1

1. Which of the following are statements?

   N What an odd question!

   Y The integer 27 is prime.

   Y Trees can walk.

   N $x^2 \geq 0$.

   N Solve the equation $x^2 + x + 1 = 0$.

   Y It is hot outside.

2. Consider the conditional statment: "If Akhed takes Zrith to the concert, then Zrith will take Akhed to dinner."

   Which of the following is the hypothesis?

   N Zrith will take Akhed to dinner

   Y Akhed takes Zrith to the concert

   Which of the following is the conclusion?

   Y Zrith will take Akhed to dinner

   N Akhed takes Zrith to the concert

   Which of the following implies that this statement is false:

   N Akhed takes Zrith to the concert

   N Zrith takes Akhed to dinner

   Y Akhed takes Zrith to the concert and Zrith does not take Akhed to dinner

   N The concert is cancelled

Worksheet

1. Which of the following sentences are statements?

   (a) $3^2 + 4^2 = 5^2$.

   (b) $a^2 + b^2 = c^2$.

   (c) There exist integers a, b, and c such that $a^2 + b^2 = c^2$.

   (d) If $x^2 = 4$, then $x = 2$.

   (e) For each real number x, $x^2 = 4$, then $x = 2$.

   (f) For each real number t , $\sin^2 t + \cos^2 t = 1$.

   (g) $\sin x < \sin(\pi/4)$.

   (h) If n is a prime number, then n^2 has three positive factors.

   (i) $1 + \tan^2 \theta = \sec^2 \theta$.

   (j) Every rectangle is a parallelogram.

   (k) Every even natural number greater than or equal to 4 is the sum of two prime numbers.

   Of those which are statements, which are true ?

2. Identify the hypothesis and the conclusion for each of the following conditional statements.

   (a) If n is a prime number, then n^2 has three positive factors.

   (b) If a is an irrational number and b is an irrational number, then $a \cdot b$ is an irrational number.

   (c) If p is a prime number, then $p = 2$ or p is an odd number.

   (d) If p is a prime number and $p \neq 2$, then p is an odd number.

   (e) If $p \neq 2$ and p is an even number, then p is not prime.

3. Determine whether each of the following conditional statements is true or false.

   (a) If $10 < 7$, then $3 = 4$.

   (b) If $7 < 10$, then $3 = 4$.

   (c) If $10 < 7$, then $3 + 5 = 8$.

   (d) If $7 < 10$, then $3 + 5 = 8$.