

Ma2201/CS2022 Quiz 0110

Discrete Mathematics

D Term, 2019

Print Name: _____ Sign:

1. (5 points) Use the double implication method to prove that

$$[(b \lor c) \land a] = [(a \land b) \lor (a \land c)].$$

♣ We did this one in class.

2. (5 points) Define a relation R on the set \mathbb{Z} by setting $(n, m) \in R$ if (n - m) has last digit 0. (Base 10, of course.)

a) Show that R is an equivalence relation.

b) Find two different equivalence classes.

♣ We also did this one in class.

Reflexive: Let $u \in \mathbb{Z}$. $(u, u) \in R$ since u - u = 0.

Symmetric: Let $(u, v) \in R$, then u - v ends in a zero. So it's negative v - u ends in a zero, so $(v, u) \in$.

Transitive: Let (u, v) and (v, w) be in R. So u - v ends in a zero and v - w ends in a zero. So u - w = (u - v) + (v - w) is the sum of two numbers ending in a zero, so it ends in a zero as well. So $(u, w) \in R$ and the relation is transitive.

The equivalence class of 0 consists of all numbers n so that n - 0 = n ends in a zero, so the multiples of 10, $\{\ldots -20, -10, 0, 10, 20, 30, \ldots\}$.

The equivalence class of 1 are all numbers n so that n-1 = n ends in a zero, so numbers one more than multiples of 10: {... - 19, -9, 1, 11, 21, 31, ...}.

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