Name: ________________
MATH55 Section ___
Homework 2
Due Thursday 1/31

14.16. Let us say that two integers are *near* one another provided the absolute value of their difference is 2 or smaller (i.e., the numbers are at most 2 apart). For example, 3 is near to 5, 10 is near to 9, but 8 is not near to 4. Let R stand for this is-near-to relation. Please do the following:

a. Write down R as a set of ordered pairs. Your answer should look like this:

$$R = \{(x, y) : ...\}$$

b. Prove or disprove: R is reflexive.
c. Prove or disprove: R is irreflexive.
d. Prove or disprove: R is symmetric.
e. Prove or disprove: R is antisymmetric.
f. Prove or disprove: R is transitive.

15.16 There is only one possible equivalence relation on a one-element set: If $A = \{1\}$, then $R = \{(1, 1)\}$ is the only possible equivalence relation. There are exactly two possible equivalence relations on a two-element set: If $A = \{1, 2\}$, then $R_1 = \{(1, 1), (2, 2)\}$ amd $R_2 = \{(1, 1), (1, 2), (2, 1), (2, 2)\}$ are the only equivalence relations on A.

How many different equivalence relations are possible on a three-element set? ... on a four-element set?

16.8 Continued from the previous problem. Suppose six of these people are men, and the other six are women. In how many ways can they join hands for a circle dance, assuming they alternate in gender around the circle?

(Last problem: Twelve people join hands for a circle dance. In how many ways can they do this?)

16.13 One hundred people are to be divided into ten discussion groups with ten people in each group. In how many ways can this be done?