Mathematics 2200H – Mathematical Reasoning
Trent University, Fall 2016
Assignment #1
Pair Constrained Triples
Due on Thursday, 15 September.

A certain kindergarten class has fifteen children and a slightly eccentric teacher. Each Monday the class goes for a walk to a local playground. For each such excursion, the teacher organizes the students into groups of three, and tries to ensure that no two children are in a group of three if they were together in some group of three in a previous week.

1. How many weeks can the teacher go before some pair of children have to end up together in a group of three for the second time? Provide as complete an explanation of your reasoning as you can! *[5]*

For example, with only three children in the class, it's pretty obvious that one can only go one week. With nine children, let's call them A through I, one could go four weeks:

Week 1	Week 2	Week 3	Week 4
ABC	ADG	AEI	AFH
DEF	BEH	BFG	BDI
GHI	CFI	CDH	CEG

The problem of explaining why one couldn't go a fifth week with a nine-children class is left to the reader.*

2. How might you generalize and abstract this problem? What can you say about the solutions to your generalized problems? *[5]*

REMINDER: You are allowed, unless stated otherwise on an assignment, to look things up and work together. Do please provide references for any sources you end up using and make sure to write up your solutions separately.

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* Leaving something "to the reader" is a technique best left to professionals. :-) Please don't use it in this class . . .