Math 350' Homework

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In class the last few weeks we have been studying questions related to Ramsey Theory. Although I have not stated it in exactly this way, the problems generally boil down to the following idea:

Suppose we have a set S, and we divide it up into k parts (this is the coloring). Can you guarantee that one of the parts contains a certain substructure, provided that S is large enough?

What kinds of applications could there be for such problems? In the case that k = 2, in particular, can you think of particular reasons why these questions might be of import? Write a little about Ramsey Theory, and its potential applications both within mathematics and other fields. You may do some googling if you like to support your ideas.