Math 311
Project 1 Handout

Instructions: This handout is designed to describe a project on one of the "Additional Topics" that may to choose to complete in order to satisfy the Project component of your grade in the course. As noted in the Course Policies Handout, you can earn 25 points (or more) based on the progress you make on these projects. To help make sure that you have time to work on these, you will be given time in class to work on these rather than our standard Daily Group Work assignments during the next three class periods (starting on Thursday, November 29th). You are encouraged to work in groups on these projects. You should turn in **three** projects for grading. One should be completed by Tuesday, December 4th. Your second is due on Thursday, December 6th, and your third project must be completed by Tuesday, December 11th. You will have the opportunity to earn up to 10-12 points on each of these projects. Any points beyond 25 points will count as extra credit.

Project 1: Chicken Nugget Problems

Recall: On the Take-Home portion of Exam 2, you considered a restaurant that sells chicken nuggets in packs of 4 or 15. Your goal was to find the largest number of chicken nuggets that you **cannot** buy exactly and you were asked to fully justify your answer. In this project, we will look at more examples of problems of this type with a goal of observing patterns and drawing more general conclusions about these scenarios.

1. (2 points) Suppose that a fast food restaurant sells chicken nuggets in packs of 4, 7, or 9. What is the largest number of chicken nuggets that you **cannot** buy *exactly*? Justify your answer.

2. (2 points) Suppose that a different restaurant sells chicken nuggets in packs of 5 or 11. What is the largest number of chicken nuggets that you **cannot** buy *exactly*? Justify your answer.

3. (2 points) Suppose that a different restaurant sells chicken nuggets in packs of 6, or 9. Is there a largest number of chicken nuggets that you **cannot** buy *exactly*? Justify your answer.

4. (2 points) Create your own scenario for a restaurant that sells chicken nuggets in packs of 2 different sizes. Find the largest number of chicken nuggets that you **cannot** buy *exactly* in your example restaurant and justify your answer. Make sure that you choose an example for which there is a largest number that you **cannot** buy and try to make your example as interesting as possible.

5. (3 points) Given a restaurant that sells chicken nuggets in packs of size $n_1, n_2, ..., n_k$, what needs to be true about $n_1, n_2, ..., n_k$ to guarantee that there is a largest number of chicken nuggets that you cannot buy exactly? What patterns (if any) do you notice about what this largest number is in terms of the sizes that are available?