

Math 102
Project 1 Handout
Due: 9/30/2008

Instructions: This project is designed to give you an opportunity to explore some of the concepts from set theory. Complete as much of this project as you can by the due date (Monday, Sept. 29th). You should write up your solutions neatly and all pertinent work leading up to your solution should be included. If you consult any references (books or on line material), cite the relevant sources either in footnotes, or at the end of your project.

1. (3 points each) Use Venn diagrams to decide whether or not the following statements are true. If a statement is false, give a *specific counterexample* that shows that it cannot be true. If a statement is true, give a *specific example* where the set equality holds.
 - (a) $(A \cup C) \cap B' = (A \cap B') \cup (C \cap B')$
 - (b) $A \cap (B \cup C') = A - (B \cap C)$

2. (4 points) Draw a Venn diagram showing all 16 possible regions for four sets, A , B , C , and D . Number each region in your diagram and then make a list indicating which of the four sets is represented in each region.

3. (10 points)
 - (a) 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*. You must justify your answer to receive full credit.
 - (b) Now suppose that a different restaurant sells chicken nuggets in packs of 4 or 15. What is the largest number of chicken nuggets that you **cannot** buy *exactly*. You must justify your answer to receive full credit.