Math 321 Fall 2016
Homework 6
Due: October 14, 2016

You are welcome to work together but everyone needs to write up **distinct** solutions. If you use any books outside of our textbook or other people, please make sure to give them credit. Make sure your solutions are complete. If your handwriting is atrocious, I am happy to give you a basic introduction to LaTeX.

1. Let G be a group and let H and K be subgroups of G. Let $a \in G$. Show that the two sets $Ha \cap Ka$ and $(H \cap K)a$ are equal. Thus the right cosets of the subgroup $H \cap K$ are obtained by intersecting the corresponding right cosets of H and K individually.

2. # 10.5

3. # 10.7

4. Let G be a group of order p^k where p is a prime and k is a positive integer. Show that G must have a subgroup of order p.

5. # 11.1

6. # 11.4

7. (a) #11.10

   (b) Give an example to show that the order of Hg in G/H may be strictly smaller than the order of g in G.

8. #11.14

9. (8 points) (a) # 11.17

   (b) # 11.18

   (c) If H and G/H are abelian, must G be abelian?

10. # 11.27