**Real Analysis - Homework Chapter 5**

1. Find the following unions or intersections:
2. Consider the set , i.e. the interval from -1 (included) to 2 (excluded), together with the point {3/1, 5/2, 7/3, 9/4, …}. Is it open or closed, or neither? Which points are interior points and boundary points? Which points are isolated and which ones are accumulation points?
3. The closure of a set S is . Find:
4. Are the following sets open, closed, or neither? If a set is *not* closed, find its closure, i.e. the set itself together with its boundary:
   1. Q
   2. N
5. True or false:
   1. If is a collection of closed sets, then is closed
   2. If is a collection of closed sets, then is closed
   3. If *p* is an isolated point of *S* then *p* is a boundary point of *S*
   4. If *x* is an interior point of *S*, then *x* is an accumulation point of *S*
   5. If *x* is a boundary point of *S*, then *x* is an accumulation point of *S*
   6. If *s = sup(S)*, then *s* is an accumulation point of *S*
   7. If *L = lim (an)*, then *L* is an accumulation point of *{an}*
   8. If *s = sup(S)* and *s* is not in *S*, then *s* is an accumulation point of *S*
   9. *closure(int(S)) = int(closure(S))*
   10. *closure(int(S)) = S*
6. Which sets are compact?
7. Show that if *C* is compact and *F* is closed, then is compact
8. Show that if *C* is compact then *sup(C)* and *inf(C)* both exist and are elements of *C*
9. Find a collection of sets such that each is closed and not empty, , but the intersection of all the is empty.
10. Find a collection of sets such that each is open and not empty, , but the intersection of all is closed and nonempty.