MA 4200: Quiz 2

Name:____

1. Prove the following statements for probability space S and the given events.
   (a) Let A, B be events. If $A \subseteq B$ then $Pr(A) \leq Pr(B)$
   (b) Let A, B be events. Then $Pr(A \cup B) = Pr(A) + Pr(B) - Pr(A \cap B)$
   (c) For any event E, $Pr(E^c) = 1 - Pr(E)$.
   (d) For any event E, A, $Pr(A) = Pr(A \cap E) + Pr(A \cap E^c)$.
   (e) Let $E_1, E_2, \cdots, E_n$ form a partition for the set S. Then
   $$Pr(A) = Pr(A \cap E_1) + Pr(A \cap E_2) + \cdots + Pr(A \cap E_n)$$
2. Write out a rule for $Pr(A \cap B \cap C)$.
3. this Olympics NBC wanted to see how to schedule events better. So they ask you a few questions given the following information. For the three sports Alpine Skiing, Biathlon and Curling. We know
   - 29 % watched Alpine Skiing
   - 30 % watched Biathlon
   - 45 % watched Curling
   - 16 % watched Alpine Skiing and Curling
   - 10 % watched Alpine Skiing and Biathlon
   - 13 % watched Biathlon and Curling
   - 6 % watched Alpine Skiing, Biathlon and Curling

   (a) How many people did not watch any of these three sports?
   (b) How many people watched Curling only?
   (c) How many people watched Curling and Biathlon but did not watch Alpine Skiing?
   (d) Let the letters stand for A = Alpine Skiing, B = Biathlon and C = Curling. Compute $Pr(A \setminus C)$, $Pr(A \setminus (B \cup C))$ $Pr(A \setminus (B \cap C))$.
4. After more Olympics analysis by NBC on Skijöring (skiing behind horses) and Dog Sled Racing we have the following data. People that watched both skijöring and dog sled racing were 35 % and 17 % viewed neither. If we know that skijöring is twice as popular as Dog Sled Racing how many people watched skijöring and how many people watched dog sled racing?