Problem Set 8

Due dates: Electronic submission of this homework is due on **Friday 11/3/2017 before 2:50pm** on ecampus, a signed paper copy of the pdf file is due on **11/3/2017** at the beginning of class.

Name: (put your name here)

Resources. (All people, books, articles, web pages, etc. that have been consulted when producing your answers to this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: ____________________________

Problem 1 (20 points)**.** On perusall.com, make at least five insightful remarks on the chapter on probability theory. You are not allowed to give spoilers on exercise solutions.

Solution. Type in your comments in perusall.com. You need to spread out your comments. It is recommended that you do not make the comments too short. Comments are automatically graded by perusall.com.

Problem 2 (10 points)**.** Solve Exercise 2.2 on page 3 of the probability theory lecture notes in perusall.

Solution.

Problem 3 (10 points)**.** Solve Exercise 2.4 on page 3 of the probability theory lecture notes in perusall.

Solution.

Problem 4 (10 points)**.** Solve Exercise 2.6 on page 4 of the probability theory lecture notes in perusall.

Solution.

Problem 5 (15 points)**.** Consider the set $S = \{1, 2, \dots, n\}$. We generate a subset X of S as follows: a fair coin is flipped independently for each element in S; if the coin lands on heads, then the element is added to X, and otherwise it is not added. Show that X is equally likely to be any of the 2^n possible subsets.

Solution.

Problem 6 (15 points)**.** Suppose that two sets X and Y are chosen independently and uniformly at random from all the 2^n subsets of $S = \{1, 2, \dots, n\}$. Determine $\Pr[X \subseteq Y]$.

Solution.

Problem 7 (20 points)**.** There may be several different min-cut sets in a graph with n vertices. Show that there can be at most $n(n-1)/2$ distinct min-cut sets. [Hint: The analysis of the min-cut algorithm can help.]

Solution.

Checklist:
- ☐ Did you add your name?
- ☐ Did you disclose all resources that you have used?
  (This includes all people, books, websites, etc. that you have consulted)
- ☐ Did you sign that you followed the Aggie honor code?
- ☐ Did you solve all problems?
- ☐ Did you submit the pdf file of your homework?
- ☐ Did you submit a hardcopy of the pdf file in class?