

MATH 341: PROBABILITY: FALL 2009: HOMEWORK #12

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Due Thursday December 10 (though you may place in my mailbox up till 10am on Friday 12/11):

DO ANY THREE OF THE PROBLEMS BELOW, BUT ONE OF THE THREE PROBLEMS MUST BE PROBLEM #1. *If you choose to do either problem 5 or 6 (you of course may elect to do both), you must email me your .tex file and .pdf, and note on the homework you submit to the grader which of these problems you elected to do.*

- (1) **Everyone must do this one:** Take two homework or exam problems where you lost points this semester because your logic was incorrect (i.e., what you wrote was wrong and not just you left the problem blank). Write a short TeX document where you state the problem and explain your reasoning as to why you made the mistake you did, and email me the TeX file. Make sure you give the file a name which begins with your lastname (this makes it easy for me to keep track of who's work I'm viewing).
- (2) Come to my office and give a 5 to 10 minute presentation on some topic on probability that we have not covered in class. This could be the solution to a problem we haven't done from a section we've studied, summarizing a section we haven't studied, summarizing a paper, The point of this exercise is to get practice orally presenting information (in addition to being good in its own right, it helps if you ever need a letter of recommendation, as I can then talk about your presentation skills).
- (3) Consider a random variable X with the standard Laplace distribution, so the density is $f(x) = \exp(-|x|)/2$. According to Chebyshev's inequality or theorem, what is the probability X is more than k standard deviations from the mean? Do you think this a good estimate? What is the actual probability?
- (4) Consider a Cauchy random variable X , so $f(x) = \frac{1}{\pi(1+x^2)}$. What does Chebyshev's theorem or inequality say about the probability $|X| > 2009$? Estimate this probability.
- (5) Write up a problem of your choosing and a solution.
- (6) Read a paper involving probability and give a one page summary.
- (7) Work on one of the research projects mentioned in class. If you elect to do this, contact me.