

Math 314 May 2008 — Homework 1a

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1. Prove that $P(A^c) = 1 - P(A)$ where $A^c = \{x|x \notin A\}$.
2. Prove that the following three statements are equivalent:
 - (i) $P(A|B) = P(A)$
 - (ii) $P(A \cap B) = P(A)P(B)$
 - (iii) $P(B|A) = P(B)$
3. For a binomial random variable Y , the variance is $V[Y] = np(1 - p)$. Use the definition of variance to find $E[Y^2]$ and then use that to find $E[6Y^2 - 2Y + 1]$.
4. Using the definition of variance, prove that $V[aY + b] = a^2V[Y]$.
5. What is the expected winnings per turn in a game of roulette if one always bets 00. (See <http://en.wikipedia.org/wiki/Roulette> for the appropriate odds.)
6. The normal method of modeling coin flips gives a probability measure on the sample space $S = \{HHHH, HHHT, HHTH, \dots\}$. Give another probability measure on this space and prove that it's a probability measure.