HOMEWORK ASSIGNMENT #1

DUE: Monday, January 26, 2015
CSCI573: Probabilistic Reasoning, Prof. Nevatia
Spring Semester, 2015

Do the following exercises.
It is preferred that you submit your solutions in hard copy form in class. However, DEN students, and others who are unable to attend the class in person, may submit electronically in the "Dropbox" on the course page. It is not necessary to neatly format your equations but please do write cleanly.

1. Derive a generalized version of Bayes' rule stated as:

$P(X| Y, Z) = \{P(Y|X, Z)\, P(X|Z)\} / P(Y|Z)$.

2. Prove the "symmetry" and "decomposition" properties, defined in equations (2.7) and (2.8) of the KF book.

3. Show that the variance of a random variable can be written as:
$\mathbf{V}\text{ar}[X] = \mathbf{E}[X^2] - (\mathbf{E}[X])^2$

4. Let $X \sim N(\mu; \sigma^2)$ and define a new variable $Y = aX + b$. Show that $Y \sim N(a\mu + b; a^2\sigma^2)$ (Exercise 2.14 from the KF book).