

Homework #4

- 1 If two continuous random variables X and Y are uncorrelated, are they necessarily independent as well? If yes, please prove your answer. If not, please give an example (Please give the complete probability model of X and Y in your example).
- 2 Is the relation $Y=aX+b$ a necessary condition for random variables X and Y to have a correlation coefficient $=1$? If yes, please prove your answer. If not, please give an example (Please give the complete probability model of X and Y in your example).
- 3 What is the sufficient condition for random variables X and Y so that when they are orthogonal, they are also uncorrelated (and vice versa)? Please prove your answer.

For problems 4 to 16, please refer to textbook problems: 4.1.6, 4.4.4, 4.6.11, 4.7.10, 4.9.12, 4.9.14, 4.9.15, 4.10.10, 4.10.14, 4.10.15, 4.10.16, 4.10.17, 4.11.6.

Please note that there are 16 problems in total.