STA2111F, Fall 2011, Homework #1

Due at 1:10 p.m. <u>sharp</u> in class on Monday, October 31. Homeworks which are late, even by one minute, will be penalised, as described in the course handout.

The assignment: Do the following exercises, **explaining all of your reasoning in complete detail**. (Here "text exercise" refers to exercises from Rosenthal, J.S. (2006), *A First Look at Rigorous Probability Theory, Second Edition* – make sure you have the <u>second</u> edition, not the <u>first</u> edition.) Point values are noted in [square brackets].

PLEASE ALSO INCLUDE AT THE BEGINNING YOUR NAME, STUDENT NUMBER, E-MAIL ADDRESS, DEPARTMENT, PROGRAM, AND YEAR.

  1. Text exercise 1.3.1. [6]

  2. Text exercise 1.3.3. [5]

  3. Text exercise 2.3.16. [10]

  4. Text exercise 2.7.1. [6]

  5. Text exercise 2.7.5. [10]

  6. Text exercise 2.7.15. [16 = 6 for part (a) + 10 for part (b)]

  7. Text exercise 2.7.21. [10]

  8. Let $(\Omega, \mathcal{F}, \mathbf{P})$ be Uniform$[0, 1]$, i.e. Lebesgue measure on $[0, 1]$. Define random variables X and Y by $X(\omega) = \omega$, and $Y(\omega) = \omega^2 + \frac{3}{16}$. For each of the following events, (i) identify the corresponding subset of Ω, (ii) explain why it is in $\mathcal{F}$, and (iii) compute its probability.
   (a) $\{X > 1/3\}$. [3]
   (b) $\{Y < 1\}$. [3]
   (c) $\{X < Y\}$. [4]

  9. Text exercise 3.6.1. [5]

  10. Text exercise 3.6.3. [10 = 5 for part (a) + 5 for part (b)]

  11. Text exercise 3.6.5. [10]

  12. Text exercise 3.6.7. [6]

  13. Text exercise 3.6.15. [10]

  14. Text exercise 3.6.17. [6]

  [Total points = 120.]

Note: You are welcome to discuss these exercises in general terms with your classmates. However, you should figure out the details of your solutions, and write up your solutions, entirely on your own. Directly copying other solutions is strictly prohibited.

Reminder: The mid-term test will be held in class at 1:10pm on Monday, October 24, in room 410 of the Haultan Building (HA) at 170 College Street (rear).