

Maths 4255  
Spring 2009  
Take-Home Assignment # 3  
Due Date: In-Class on 02/17/2009

**Instructions:** Your solutions must appear in an organized and legible format to be given full consideration.

1. (**chap 3, ex73, Problems**): Suppose that each child born to a couple is equally likely to be a boy or a girl independent of the sex distribution of the other children in the family. For a couple having 5 children, compute the probabilities of the following events:
  - (a) All children are the same sex.
  - (b) The 3 eldest are boys and the others girls.
  - (c) Exactly 3 are boys.
  - (d) The 2 oldest are girls.
  - (e) There is at least 1 girl.
2. (**chap 3, ex11, Theoretical exercises**) If a total of  $n$  independent tosses of a coin that lands on heads with probability  $p$  are made. How large need  $n$  be so that the probability of obtaining at least one head is at least  $1/2$ ?
3. (**Bonus question**) Let  $A_1, A_2, \dots, A_n$  be independent events. Show that the probability that none of the  $A_1, A_2, \dots, A_n$  occur is less than or equal to

$$e^{-\sum_{i=1}^n P(A_i)}$$