

**Probability and Statistics for Psychology
and Quantitative Methods for Human Sciences
Exercise Sheet 2 - Probability I**

1. A six-sided die has unequally weighted sides, so that the probabilities of 1,2,3,4,5,6 coming up are, respectively, 0.3, 0.2, 0.2, 0.1, 0.1, 0.1. The die is rolled twice.
 - (a) What is the probability that both rolls come up 1?
 - (b) What is the probability that at least one roll comes up 1?
 - (c) What is the probability that the same number comes up on both rolls?

2. An ordinary pack of 52 playing cards has cards in 13 values (2, 3, 4, 5, 6, 7, 8, 9, 10, jack, queen, king, ace), each in 4 suits (clubs, diamonds, hearts, spades). We have a pack from which the seven of diamonds has been lost. A card is dealt from the well-shuffled pack. Find the probability that it is (a) a diamond, (b) a queen, (c) a diamond or a queen, (d) a diamond or a seven.

3. A 1996 study of mental health issues and drug use among students at 10 UK universities (“Alcohol and drug use in UK university students”, Webb *et al.*, *The Lancet* 5 Oct., 1996) found the following results about alcohol consumption:

# Units Alcohol per week	Male	Female
0	176	153
1–14	363	673
15–21	198	245
22–28	200	158
29–35	166	82
26–50	256	105
> 50	251	31

Thus, for example, there were 1610 men and 1447 women in the sample, and 153 women in the sample reported consuming no alcohol. For a randomly selected student in the sample,

- (a) What is the probability that the student reported consuming less than 15 units of alcohol per week?
- (b) What is the probability that the student did not report consuming less than 15 units of alcohol per week?
- (c) What is the probability that the student was male?
- (d) What is the probability that the student was male and reported consuming less than 15 units of alcohol per week?
- (e) Are the events {student was male} and {student consumed < 15 units alcohol} independent?

- (f) What is the probability that the student was male or reported consuming less than 15 units of alcohol per week?
 - (g) Approximately what is the probability that the student reported consuming more than 25 units of alcohol per week? What assumptions do you need to make, and how much might your estimate be off by?
 - (h) What is the sample space for the probabilities in the above questions?
4. Consider the experiment of tossing two fair six-sided dice. Let A denote the event of an odd total, B the event of a 1 on the first die, and C the event of a total of seven.
- (a) Are A and B independent?
 - (b) Are A and C independent?
 - (c) Are B and C independent?