Semester 1	MATH1015 (BIOSTATISTICS) ASSIGNMENT	2013

Important:

This assignment will be worth 5% towards your final raw mark. This will be due on Tuesday 30 April. See the course Information Sheet/pages **27-28** of the Junior Mathematics Handbook for details relating to the submission. **If you use R to answer any question, then attach the R output with all commands.**

Note:

Write your answers clearly giving all necessary steps to secure full marks. A signed assignment cover sheet must be attached to your folder with your name and SID.

1. Following are the total scores of three subjects for seventy four year 8 students from a selective high school in Sydney.

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10 | 1 4 6 7 8 9
11 | 0 2 3 3 3 6 8 8 8 9
12 | 0 0 0 0 1 1 2 2 3 4 6 7
13 | 3 3 4 5 6 7 7 9 9
14 | 0 1 2 5 7 7 9
15 | 0 2 3 4 8 9
16 | 1 4 6 6 8
17 | 0 7 7 9
18 | 1 4 8
19 | 4 5 7
20 | 3 4 6
21 | 2 4
22 | 3 6
23 | 8
24 |
25 |
26 | 2
```

(a)(i) Find the five number summary for this data set.

(ii) Determine whether there are any outliers and sketch a box-plot showing clearly thresholds and outliers (if any).

(iii) Describe the shape of this distribution.

(b)(i) Find the mean and variance of this data set.

(ii) What proportion of total scores are within 1 standard deviation of the mean?

2. (a) Jonka tries to connect to his internet service provider. The probability that he connects on any single attempt is 0.85 .

(i) What is the probability that he connects for the first time on his second attempt?

(ii) He decides to attempt only three times to connect to his internet. List all possible outcomes and draw a suitable tree diagram to represent this experiment.

(iii) What is the probability that he is still not connected after his third attempt?

(b) A particular binomial distribution, $X \sim B(n, p)$ has the mean 4 and variance 3.

   (i) Find the values of n and p.

   (ii) Find the exact probability, $P(6 \leq X \leq 8)$.

(c) In a game, three regular, six-sided dice are thrown once. Find the probability of observing three different numbers. A player claims that you expect to see three different numbers on the dice in at least half of the games. Is the player correct? Justify your answer.

3. The weights of cans of soup produced by a company are normally distributed with a mean of 15g and a standard deviation of 0.5g.

(a) Find the probability that a randomly selected can of soup will weigh
(i) at least 14.3g and (ii) within 14.3g and 15.3g.

(b) Find the minimum weight of the heaviest 5% of cans of soup produced.

(c) If the soup cans are packed into boxes of 25 cans each, state the distribution of the weigh of a box. Hence find the probability that a randomly selected box weighs less than 370g.

(d) A manager has doubt on the true mean and true standard deviation and so he discards these informations. From the 25 cans in a randomly selected box, he finds the sample mean weight and sample standard deviation are 14.8g and 0.4g respectively.

   (i) Construct a 95% confidence interval for the true mean. Based on the confidence interval, is the true mean likely to be 15g?

   (ii) If the true mean is 15g, find the probability of observing a sample mean of 14.8g or less. Again, based on this probability, is the true mean likely to be 15g? (Hint: standardize the sample mean of 14.8 before using the t-table.)

END OF ASSIGNMENT