

Edexcel S3 – Ch. 1: Combining Random Variables

1. A manufacturer produces two flavours of soft drink, cola and lemonade. The weights, C and L , in grams, of randomly selected cola and lemonade cans are such that $C \sim N(350, 8)$ and $L \sim N(345, 17)$.

(a) Find the probability that the weights of two randomly selected cans of cola will differ by more than 6 g.

(6)

One can of each flavour is selected at random.

(b) Find the probability that the can of cola weighs more than the can of lemonade.

(6)

Cans are delivered to shops in boxes of 24 cans. The weights of empty boxes are normally distributed with mean 100 g and standard deviation 2 g.

(c) Find the probability that a full box of cola cans weighs between 8.51 kg and 8.52 kg.

(6)

(d) State an assumption you made in your calculation in part (c).

(1)

June 2005 Q7

2. The workers in a large office block use a lift that can carry a maximum load of 1090 kg. The weights of the male workers are normally distributed with mean 78.5 kg and standard deviation 12.6 kg. The weights of the female workers are normally distributed with mean 62.0 kg and standard deviation 9.8 kg.

Random samples of 7 males and 8 females can enter the lift.

(a) Find the mean and variance of the total weight of the 15 people that enter the lift.

(4)

(b) Comment on any relationship you have assumed in part (a) between the two samples.

(1)

(c) Find the probability that the maximum load of the lift will be exceeded by the total weight of the 15 people.

(4)

June 2006 Q5

3. A set of scaffolding poles come in two sizes, long and short. The length L of a long pole has the normal distribution $N(19.7, 0.5^2)$. The length S of a short pole has the normal distribution $N(4.9, 0.2^2)$. The random variables L and S are independent.

A long pole and a short pole are selected at random.

- (a) Find the probability that the length of the long pole is more than 4 times the length of the short pole.

(7)

Four short poles are selected at random and placed end to end in a row. The random variable T represents the length of the row.

- (b) Find the distribution of T .

(3)

- (c) Find $P(|L - T| < 0.1)$.

(5)

June 2007 Q7

4. The weights of adult men are normally distributed with a mean of 84 kg and a standard deviation of 11 kg.

- (a) Find the probability that the total weight of 4 randomly chosen adult men is less than 350 kg.

(5)

The weights of adult women are normally distributed with a mean of 62 kg and a standard deviation of 10 kg.

- (b) Find the probability that the weight of a randomly chosen adult man is less than one and a half times the weight of a randomly chosen adult woman.

(6)

June 2008 Q4