1. The weights of the oranges produced by a farm may be assumed to be normally distributed with mean 205 grams and standard deviation 10 grams.

(a) Find the probability that a randomly chosen orange weighs more than 200 grams.

(2)

(b) Five of these oranges are selected at random to be put into a bag. Find the probability that the combined weight of the five oranges is less than 1 kilogram.

(4)

(c) The farm also produces lemons whose weights may be assumed to be normally distributed with mean 75 grams and standard deviation 3 grams. Find the probability that the weight of a randomly chosen orange is more than three times the weight of a randomly chosen lemon.

(5)
(Total 11 marks)

2. A shop sells apples and pears. The weights, in grams, of the apples may be assumed to have a $N(200, 15^2)$ distribution and the weights of the pears, in grams, may be assumed to have a $N(120, 10^2)$ distribution.

(a) Find the probability that the weight of a randomly chosen apple is more than double the weight of a randomly chosen pear.

(8)

(b) A shopper buys 3 apples and 4 pears. Find the probability that the total weight is greater than 1000 grams.

(6)
(Total 14 marks)

3. (a) The random variable Y is such that $E(2Y + 3) = 6$ and $\text{Var}(2 - 3Y) = 11$.

Calculate

(i) $E(Y)$;

(ii) $\text{Var}(Y)$;

(iii) $E(Y^2)$.

(6)

(b) Independent random variables R and S are such that

$$R \sim N(5, 1) \text{ and } S \sim N(8, 2).$$

The random variable V is defined by $V = 3S - 4R$.

Calculate $P(V > 5)$.

(6)
(Total 12 marks)