



Term 2 Week 6 Math Focus

Topic: Normal Distribution

1 EJC Prelim 9758/2020/02/Q11(i), (ii), (iii) [modified]

The masses, in pounds, of apples and pears have independent normal distributions with means and standard deviations as shown in the following table.

	Mean	Standard deviation
Apple	0.33	σ
Pear	0.45	0.08

- (i) The probability of a randomly chosen apple weighing less than t pounds and that weighing between t and 0.35 pounds is 0.34 each. Find the values of σ and t . [4]
- (ii) Three pears are chosen at random. Find the probability that one of them weighs less than the population mean mass and each of the other two pears has a mass within one standard deviation of the population mean mass. [2]

The apples cost \$2.20 per pound and the pears cost \$3.10 per pound.

- (iii) Find the probability that the total cost of 3 randomly chosen apples and 2 randomly chosen pears is more than \$5. [3]

2 EJC Prelim 9758/2021/02/Q10 (modified)

In this question, you should state the parameters of any distributions that you use.

A stationery factory manufactures pens for sale. The diameters (in mm) of the pens have distribution $N(10, 0.003)$. The pens are packed in sets of 24 into a box. Within the box, the pens are laid out side by side. The widths of the boxes (in mm) are normally distributed with mean 240.5 mm and variance 0.02 mm^2 .

- (i) Find the probability that a random sample of 24 pens would fit into a randomly selected box. [3]

A pen is considered “defective” if its diameter is not within 0.1mm of the population mean.

- (ii) Find the probability that a randomly selected pen is defective. [2]

Pens are produced and inspected in batches. For each batch, a sample of 12 pens is randomly selected and checked.

- If there are fewer than 2 defective pens in this sample of 12, the batch passes the inspection.
 - If there are exactly 2 defective pens in this sample, a second sample of 12 pens is randomly selected and checked. If there are no defective pens in the second sample, the batch passes the inspection.
 - Otherwise, the batch does not pass the inspection.
- (iii) Show that the probability of a batch of pens passing the inspection is 0.871, correct to 3 significant figures. [3]
- (iv) Find the probability that not more than 3 defective pens were found in a batch of pens during the inspection process, given that the batch of pens did not pass the inspection. [3]

3 HCI JC2 Prelim 9758/2019/02/Q7

A cafe sells sandwiches in 2 sizes, “footlong” and “6-inch”. The lengths in inches of “footlong” loaves have the distribution $N(12.2, 0.04)$ and the lengths in inches of “6-inch” loaves have the distribution $N(6.1, 0.02)$.

- (i) Is a randomly chosen “footlong” loaf more likely to be less than 12 inches in length or a randomly chosen “6-inch” loaf more likely to be less than 6 inches in length? [2]
- (ii) Find the probability that two randomly chosen “6-inch” loaves have total length more than one randomly chosen “footlong” loaf. [2]

Sue buys a “6-inch” sandwich 3 times a week.

- (iii) Find the probability that Sue gets at most one sandwich that is less than 6 inches in length in a randomly chosen week. [2]
- (iv) Given that Sue gets more than four sandwiches that are less than 6 inches in length in a randomly chosen 4-week period, find the probability that she gets exactly one such sandwich in the first week. [3]