**7.** A company sells two types of board, short or long.

The weight of a short board, $S$ kg, has distribution $N(7.7, 0.01^2)$

The weight of a long board, $L$ kg, has distribution $N(20, 0.02^2)$

A random sample of 3 short boards and 4 long boards is taken.

(a) Find the probability that the total weight of the 3 short boards and the 4 long boards is more than 103.15 kg

**(4)**

A random sample of 2 long boards is taken.

(b) Find the probability that the weights of these 2 long boards differ by more than 0.01 kg

**(5)**

A random sample of $(n + 1)$ short boards is taken, with weights $S_1, S_2, S_3, ..., S_{n+1}$

The random variable $T$ is defined as

$$T = nS_1 - \sum_{r=2}^{n+1} S_r$$

Given that, to 4 decimal places, $P(T > 2) = 0.0233$

(c) calculate the value of $n$

**(6)**

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**Question 7 continued**

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**(Total for Question 7 is 15 marks)**

**TOTAL FOR PAPER IS 75 MARKS**

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