4. (i) The continuous random variable X is uniformly distributed over the interval $[a, b]$

Given that

- $\mathrm{P}(X > 27) = \frac{3}{4}$
- $\mathrm{Var}(X) = 300$

(a) find the value of a and the value of b

(3)

Given also that

$$4 \times \mathrm{P}(X < k - 10) = \mathrm{P}(X > k + 20)$$

(b) find the value of k

(2)

(ii) A piece of wire of length 42 cm is cut into 2 pieces at a random point.

Each of the two pieces of the wire is bent to form the outline of a square.

Find the probability that the side length of the larger square minus the side length of the smaller square will be greater than 2 cm.

(4)

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Question 4 continued

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Question 4 continued

(Total for Question 4 is 9 marks)