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

Given that $P(5 < X < 13) = \frac{1}{5}$ and $E(X) = 9$, find $P(3X > a + b)$

(3)

(ii) The continuous random variable Y is uniformly distributed over the interval $[1, c]$

Given that $\text{Var}(Y) = 0.48$, find the exact value of $E(Y^2)$

(4)

(iii) A wire of length 20 cm is cut into 2 pieces at a random point.
The longest piece of wire is then cut into 2 pieces, equal in length, giving 3 pieces of wire altogether.

Find the probability that the length of the shortest piece of wire is less than 6 cm.

(5)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 7 continued

Question 7 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 7 continued

Question 7 continued

(Total for Question 7 is 12 marks)

TOTAL FOR PAPER: 75 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA