6. The continuous random variable X is uniformly distributed over the interval $[a, b]$

Given that

- $\mathrm{P}(2 < X < 5) = \dfrac{3}{16}$
- $\mathrm{E}(X) = 6$

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

(3)

(b) find the value of the constant c such that $\mathrm{E}(cX + 1) = 3$

(2)

(c) find the exact value of $\mathrm{Var}(X)$

(1)

(d) find the exact value of $\mathrm{E}(X^2)$

(2)

(e) find $\mathrm{P}\left(\dfrac{3}{2}X - b > a\right)$

(2)

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Question 6 continued

(Total for Question 6 is 10 marks)