8. (a) Use the standard results for $\sum_{r=1}^{n} r^2$ and $\sum_{r=1}^{n} r$ to show that for all positive integers n

$$\sum_{r=0}^{n} (r+1)(r+2) = \frac{1}{3}(n+1)(n+2)(n+3)$$

(5)

(b) Hence determine the value of

$$10 \times 11 + 11 \times 12 + 12 \times 13 + ... + 100 \times 101$$

(3)

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(Total for Question 8 is 8 marks)

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