2. The time, in minutes, spent waiting for a call to a call centre to be answered is modelled by the random variable T with probability density function

$$f(t) = \begin{cases} \frac{1}{192}\left(t^3 - 48t + 128\right) & 0 \leqslant t \leqslant 4 \\ 0 & \text{otherwise} \end{cases}$$

(a) Use algebraic integration to find, in minutes and seconds, the mean waiting time.

(3)

(b) Show that $P(1 < T < 3) = \frac{7}{16}$

(3)

A supervisor randomly selects 256 calls to the call centre.

(c) Use a suitable approximation to find the probability that more than 125 of these calls take between 1 and 3 minutes to be answered.

(5)

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(Total for Question 2 is 11 marks)

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