191. You are given:

(i) The annual number of claims for a policyholder follows a Poisson distribution with mean Λ.

(ii) The prior distribution of Λ is gamma with probability density function:

$$f(\lambda) = \frac{(2\lambda)^5 e^{-2\lambda}}{24\lambda}, \qquad \lambda > 0$$

An insured is selected at random and observed to have $x_1 = 5$ claims during Year 1 and $x_2 = 3$ claims during Year 2.

Determine $\mathrm{E}\left(\Lambda \middle| x_1 = 5,\ x_2 = 3\right)$.

(A) 3.00

(B) 3.25

(C) 3.50

(D) 3.75

(E) 4.00