**45.** You are given:

(i) The amount of a claim, $X$, is uniformly distributed on the interval $[0,\theta]$.

(ii) The prior density of $\theta$ is $\pi(\theta)=\dfrac{500}{\theta^2}$, $\theta>500$.

Two claims, $x_1=400$ and $x_2=600$, are observed. You calculate the posterior distribution as:

$$f(\theta|x_1,x_2)=3\left(\frac{600^3}{\theta^4}\right), \quad \theta>600$$

Calculate the Bayesian premium, $\mathrm{E}(X_3|x_1,x_2)$.

(A) 450

(B) 500

(C) 550

(D) 600

(E) 650