**218.** The random variable $X$ has survival function:

$$S_X(x) = \frac{\theta^4}{(\theta^2 + x^2)^2}$$

Two values of $X$ are observed to be 2 and 4. One other value exceeds 4.

Calculate the maximum likelihood estimate of $\theta$.

(A) Less than 4.0

(B) At least 4.0, but less than 4.5

(C) At least 4.5, but less than 5.0

(D) At least 5.0, but less than 5.5

(E) At least 5.5

**219.** For a portfolio of policies, you are given:

(i) The annual claim amount on a policy has probability density function:

$$f(x \mid \theta) = \frac{2x}{\theta^2}, \quad 0 < x < \theta$$

(ii) The prior distribution of $\theta$ has density function:

$$\pi(\theta) = 4\theta^3, \quad 0 < \theta < 1$$

(iii) A randomly selected policy had claim amount 0.1 in Year 1.

Calculate the Bühlmann credibility estimate of the claim amount for the selected policy in Year 2.

(A) 0.43

(B) 0.45

(C) 0.50

(D) 0.53

(E) 0.56

**60.** You are given the following information about six coins:

| Coin | Probability of Heads |
|---|---|
| 1 – 4 | 0.50 |
| 5 | 0.25 |
| 6 | 0.75 |

A coin is selected at random and then flipped repeatedly. $X_i$ denotes the outcome of the *i*th flip, where "1" indicates heads and "0" indicates tails. The following sequence is obtained:

$$S = \{X_{1,} X_2, X_3, X_4\} = \{1,1,0,1\}$$

Calculate $E(X_5 \mid S)$ using Bayesian analysis.

(A) 0.52

(B) 0.54

(C) 0.56

(D) 0.59

(E) 0.63

**61.** You observe the following five ground-up claims from a data set that is truncated from below at 100:

125 150 165 175 250

You fit a ground-up exponential distribution using maximum likelihood estimation.

Calculate the mean of the fitted distribution.

(A) 73

(B) 100

(C) 125

(D) 156

(E) 173

**152.** You are given:

(i) A sample of losses is:

600 700 900

(ii) No information is available about losses of 500 or less.

(iii) Losses are assumed to follow an exponential distribution with mean $\theta$.

Calculate the maximum likelihood estimate of $\theta$.

(A) 233

(B) 400

(C) 500

(D) 733

(E) 1233

**153.** DELETED

**261.** DELETED

**262.** You are given:

(i) At time 4 hours, there are 5 working light bulbs.

(ii) The 5 bulbs are observed for $p$ more hours.

(iii) Three light bulbs burn out at times 5, 9, and 13 hours, while the remaining light bulbs are still working at time $4 + p$ hours.

(iv) The distribution of failure times is uniform on $(0, \omega)$.

(v) The maximum likelihood estimate of $\omega$ is 29.

Calculate $p$.

(A) Less than 10

(B) At least 10, but less than 12

(C) At least 12, but less than 14

(D) At least 14, but less than 16

(E) At least 16