Q1 A technician starts a job at a time X that is uniformly distributed between 8:00 AM and 8:15 AM The amount of time to complete the job, Y, is an independent random variable that is uniformly distributed between 20 and 30 minutes. What is the probability that the job will be completed before 8:30 A.M. ?

(A) 1/2 (B) 1/3 (C) 1/4 (D) 1/5 (E) other

Q2 Let X and Y have the joint probability density function given by $f(x, y) = 6(1 - y)$ if $0 \leq x \leq y \leq 1$, and 0 elsewhere. Find the conditional expectation $\mathbb{E}(Y|X = 1/2)$.

(A) 1/2 (B) 2/3 (C) 3/4 (D) 4/5 (E) other

Q3 Let $\{X_1, \ldots, X_9\}$ be an independent collection of random variables having the common mean $\mu = 1$ and variance $\sigma^2 = 4$. Let $\overline{X} = \frac{1}{9}(X_1 + \ldots + X_9)$. What is $\mathrm{Var}(\overline{X})$?

(A) 1/9 (B) 4/9 (C) 4 (D) 4/81 (E) other

Q4 Let X and Y denote the values of two stocks at the end of a five-year period. X is uniformly distributed on the interval $(0, 12)$. Given $X = x$, Y is uniformly distributed on the interval $(0, x)$. Calculate $\mathrm{Cov}(X, Y)$ according to this model.

(A) 0 (B) 4 (C) 6 (D) 12 (E) 24