Q1 Let X_1 X_2, X_3 be three independent standard normals. Let $S = X_1 + X_2$ and $T = X_1 + X_3$. Find Cor(S, T).

(A) 1/4 (B) 1/3 (C) 1/2 (D) $1/\sqrt{2}$ (E) other

Q2 The joint density of X and Y is given by $f(x, y) = \frac{e^y}{y}$, $0 < x < y$, $0 < y < \infty$. Compute $\mathbb{E}[X^2 | Y = 1]$.

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

Q3 I repeatedly roll a fair die. If it comes up 6, I instantly win (and stop playing); if it comes up k, for any k between 1 and 5, I wait k minutes and then roll again. What is the expected elapsed time from when I start rolling until I win? (Note: If I win on my first roll, the elapsed time is zero.)

(A) 15 min (B) 18 min (C) 20 min (D) 24 min (E) other

Q4 A drawer contains red socks and black socks. When two socks are drawn at random, the probability that both are red is $\frac{1}{2}$. How small can the number of socks in the drawer be?

(A) 3 (B) 4 (C) 5 (D) 6 (E) other