Question #125
Key: A

Let N_1, N_2 denote the random variable for # of claims for Type I and II in 2 years

X_1, X_2 denote the claim amount for Type I and II

$S_1 =$ total claim amount for type I in 2 years

$S_2 =$ total claim amount for Type II at time in 2 years

$S = S_1 + S_2 =$ total claim amount in 2 years

$\{S_1\} \to$ compound poisson $\lambda_1 = 2 \times 6 = 12 \quad X_1 \sim U(0,1)$

$\{S_2\} \to$ compound poisson $\lambda_2 = 2 \times 2 = 4 \quad X_2 \sim U(0,5)$

$$E(N_1) = Var(N_1) = 2 \times 6 = 12$$

$$E(S_1) = E(N_1)E(X_1) = (12)(0.5) = 6$$

$$Var(S_1) = E(N_1)Var(X_1) + Var(N_1)(E(X_1))^2$$

$$= (12)\frac{(1-0)}{12} + (12)(0.5)^2$$

$$= 4$$

$$E(N_2) = Var(N_2) = 2 \times 2 = 4$$

With formulas corresponding to those for S_1,

$$E(S_2) = 4 \times \frac{5}{2} = 10$$

$$Var(S_2) = 4 \times \frac{(5-0)^2}{12} + 4\left(\frac{5}{2}\right)^2 = 33.\overline{3}$$

$$E(S) = E(S_1) + E(S_2) = 6 + 10 = 16$$

Since S_1 and S_2 are independent,

$$Var(S) = Var(S_1) + Var(S_2) = 4 + 33.\overline{3} = 37.\overline{3}$$

$$\Pr(S > 18) = \Pr\left(\frac{S-16}{\sqrt{39.\overline{3}}} > \frac{2}{\sqrt{37.\overline{3}}} = 0.327\right)$$

Using normal approximation

$$\Pr(S > 18) = 1 - \Phi(0.327)$$

$$= 0.37$$