Department of Mathematics
MTL 106 (Introduction to Probability Theory and Stochastic Processes)
Tutorial Sheet No. 3
Answer for selected Problems

2. $E[X^2] = \lambda(\lambda+1)$, $Var(X) = \lambda^2$, $E[X^3] = \lambda^3 + 3\lambda^2 + \lambda$.

5. 81.86%

6. $\mu = 2.464, \sigma = 0.0346$

8. $P = \frac{(\beta-\alpha)^2}{\beta^2}$

9. $f_Y(y) = \begin{cases} \binom{n}{y}\frac{\beta(a+y,n-y+b)}{\beta(a,b)}, & y \in \{0,1,\ldots,n\} \\ 0, & y \notin \{0,1,\ldots,n\} \end{cases}$

10. $P(Y \geq 200/X = 99) = \frac{P(Y\geq 200, X=99)}{P(X=99)}$

11. 0.74

12. (a) $\frac{1+e^{-0.06}}{2}$ (b) (i) 0.97 (ii) 0.02

13. $\frac{3e^4}{1+3e^4} = 0.994$.

14. $0.75, 0.5$.

15. $f_Y(y) = \begin{cases} e^{-y}, & y \geq 0 \\ 0, & \text{otherwise.} \end{cases}$

16. $\frac{2.188}{14}$

20. (a) X follows Poisson(μ).
(b) $e^{-4}\sum_{i=1}^{7}\frac{4^i}{i!}$.

21. $P(X > X^2) = \begin{cases} 1/a, & a \geq 1 \\ 1, & a \leq 1. \end{cases}$

22. $f_Y(y) = \begin{cases} \frac{2\lambda e^{-\lambda y^{2/3}}}{3y^{2/3}}, & y > 0 \\ 0, & y \leq 0. \end{cases}$

25. $\phi(\sqrt{2}) = 0.92$.

26. 0.383.

27. 0.18.

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