MATH 370 X
Additional Questions 4
Exp., Var. and MGF (Discrete R.V.s)

1. A tour operator has a bus that can accommodate 20 tourists. The operator knows that tourists may not show up, so he sells 21 tickets. The probability that an individual tourist will not show up is 0.02, independent of all other tourists. Each ticket costs 50, and is non-refundable if a tourist fails to show up. If a tourist shows up and a seat is not available, the tour operator has to pay 100 (ticket cost + 50 penalty) to the tourist. What is the expected revenue of the tour operator?
   (A) 935  (B) 959  (C) 967  (D) 976  (E) 985

2. An urn contains 100 lottery tickets. There is one ticket that wins $50, three tickets that win $25, six tickets that win $10, and fifteen tickets that win $3. The remaining tickets win nothing. Two tickets are chosen at random, with each ticket having the same probability of being chosen. Let X be the amount won by the one of the two tickets that gives the smaller amount won (if both tickets win the same amount, then X is equal to the amount). Find the expected value of X.
   (A) 0.1348  (B) 0.0414  (C) 0.2636  (D) 0.7922  (E) Does not exist

3. The number of claims N per year in a certain reinsurance policy has been believed to follow a Poisson distribution with a mean of 1. Based on the reinsurer’s historical data, the reinsurer decides to use a new probability random variable M to describe the number of claims, with Pr(M=0)=0.5, and Pr(M=K)=c × Pr(N=k) for k=1,2,..., with c being a certain constant.
   Find E(M).
   (A) 0.79  (B) 0.63  (C) 0.50  (D) 0.37  (E) 0.21

4. Let X be a discrete random variable with moment generating function

   \[ M_X(t) = \frac{1}{2} + \frac{1}{2} \sum_{n=0}^{\infty} e^{nt} \]

   for t<2. Find E(X).
   (A) 1  (B) \frac{3}{4}  (C) \frac{3}{2}  (D) \sum_{n=0}^{\infty} \frac{e^{-n}}{n!}  (E) E(X) does not exist

   [online exercise 2005]

5. You are given that a random variable N is discrete and assumes only positive integer values with Pr(N=n) proportional to 2^(-n) for n=1,2,3,... Find the expected value of N.
   (A) \frac{1}{2}  (B) \frac{1}{2}  (C) \frac{3}{2}  (D) 2  (E) Does not exist
6. Let the random variable $X$ have the moment generating function $M(t) = \frac{e^{3t}}{1-t^2}$ for $-1 < t < 1$. Find the mean and variance of $X$.
(A) 1 and 2 (B) 1 and 3 (C) 3 and 2 (D) 3 and 3 (E) 3 and 6

7. An insurance company insures against fire and storm in a combined policy. The probability of a fire is 0.01 and the probability of a storm produces losses of $3000. There is a deductible of $100. Find the coefficient of variation of the amount paid by the insurance company, assuming there can be at most one fire and at most one storm per year.
(A) 5.24 (B) 10.72 (C) 126.70 (D) 263.28 (E) 2632.81

Answer: ECABDCA