Department of Mathematics

MTL 106 (Introduction to Probability Theory and Stochastic Processes)

Quiz 2 Examination

Time: 20 min **Date: 05/10/2021**
Max. Marks: 10

Note: The exam is closed-book, and all the questions are compulsory and of descriptive type. The standard normal distribution table is appended with the question paper.

1. The grading scheme of a Mathematics professor is as follows:
   - A: Top 12% of scores $(A \geq 81.558)$
   - B: Scores below the top 12% and above the bottom 60% $(74.106 < B < 81.558)$
   - C: Scores below the top 40% and above the bottom 25% $(66.573 < C < 74.106)$
   - D: Scores below the top 75% and above the bottom 8% $(60.66 < D < 66.573)$
   - F: Bottom 8% of scores. $(F \leq 60.66)$

   Scores on the test follow normal distribution with a mean of 72 and a standard deviation of 8.1. Find the numerical limits for all the grades. (5 marks)

2. Let $X_1, X_2, \ldots$ be iid random variables, each having exponential distribution with parameter $\frac{1}{4}$. Define $Y_i = X_i - X_i^2$, $i = 1, 2, \ldots$. Use central limit theorem to evaluate $P\left(\sum_{i=1}^{40} Y_i \geq 40\right)$ approximately. (5 marks)

$\simeq 0.0036$

$E(Y_i) = -28$

$Var(Y_i) = 4624$

other Papers

$A \geq 80.4287$
$77.508 < B < 80.4$
$63.657 < C < 77.5$
$58.716 < D < 63.6$
$F \leq 58.716$
$E(Y_i) = -45$
$Var(Y_i) = 11,525$
$P(\ldots) \simeq 0.0013$

$A \geq 82.449$
$75.159 < B < 82.4$
$65.196 < C < 75.1$
$61.713 < D < 65.1$
$F \geq 61.713$
$E(Y_i) = -6$
$Var(Y_i) = 260$
$P(\ldots) \simeq 0.0262$

$A \geq 83.421$
$76.293 < B < 83.4$
$67.788 < C < 76.293$
$62.523 < D < 67.7$
$F \geq 62.5$
$E(Y_i) = -15$
$Var(Y_i) = 1413$
$P(\ldots) \simeq 0.0099$