Statistics 351 Quiz #1 – September 16, 2009

This quiz consists of 6 multiple choice questions. Circle the correct answer; you do not need to justify your answers.

This exam is closed-book, except that one $8\frac{1}{2} \times 11$ *double-sided page of handwritten notes is permitted as well as an approved calculator.*

Name: ____________________________________

Instructor: Michael Kozdron

TOTAL: ____________

1. An actuary studying the insurance preferences of automobile owners makes the following conclusions.

(i) An automobile owner is twice as likely to purchase collision coverage as disability coverage.

(ii) The event that an automobile owner purchases collision coverage is independent of the event that he or she purchases disability coverage.

(iii) The probability that an automobile owner purchases both collision and disability coverages is 0.15.

What is the probability that an automobile owner purchases neither collision nor disability coverage?

(A) 0.18

(B) 0.33

(C) 0.48

(D) 0.67

(E) 0.82

2. The number of injury claims per month is modeled by a random variable N with

$$P[N = n] = \frac{1}{(n+1)(n+2)}$$

where $n \geq 0$. Determine the probability of at least one claim during a particular month, given that there have been at most four claims during that month.

(A) $\frac{1}{3}$

(B) $\frac{2}{5}$

(C) $\frac{1}{2}$

(D) $\frac{3}{5}$

(E) $\frac{5}{6}$

3. Let X be a continuous random variable with density function

$$f(y) = \begin{cases} \dfrac{|x|}{10}, & \text{for } -2 \le x \le 4, \\ 0, & \text{otherwise.} \end{cases}$$

Calculate the expected value of X.

(A) $\dfrac{1}{5}$

(B) $\dfrac{3}{5}$

(C) 1

(D) $\dfrac{28}{15}$

(E) $\dfrac{12}{5}$

4. An insurance policy pays an individual 100 per day for up to 3 days of hospitalization and 25 per day for each day of hospitalization thereafter.

The number of days of hospitalization, X, is a discrete random variable with probability function

$$P(X = k) = \begin{cases} \dfrac{6-k}{15}, & \text{for } k = 1, 2, 3, 4, 5, \\ 0, & \text{otherwise.} \end{cases}$$

Calculate the expected payment for hospitalization under this policy.

(A) 85

(B) 163

(C) 168

(D) 213

(E) 255

5. An actuary determines that the claim size for a certain class of accidents is a random variable, X, with moment generating function

$$M_X(t) = \frac{1}{(1-2500t)^4}.$$

Determine the standard deviation of the claim size for this class of accidents.

(A) 1,340

(B) 5,000

(C) 8,660

(D) 10,000

(E) 11,180

6. An insurer's annual weather-related loss, X, is a random variable with density function

$$f(x) = \begin{cases} \dfrac{2.5(200)^{2.5}}{x^{3.5}}, & \text{for } x > 200, \\ 0, & \text{otherwise.} \end{cases}$$

Calculate the difference between the 30$^{\text{th}}$ and 70$^{\text{th}}$ percentiles of X.

(A) 35

(B) 93

(C) 124

(D) 231

(E) 298