

Statistics 351 Quiz #2 – September 18, 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 urn contains 10 balls: 4 red and 6 blue. A second urn contains 16 red balls and an unknown number of blue balls. A single ball is drawn from each urn. The probability that both balls are the same color is 0.44. Calculate the number of blue balls in the second urn.

- (A) 4
- (B) 20
- (C) 24
- (D) 44
- (E) 64

2. An insurance company determines that N , the number of claims received in a week, is a random variable with

$$P[N = n] = \frac{1}{2^{n+1}},$$

where $n \geq 0$. The company also determines that the number of claims received in a given week is independent of the number of claims received in any other week. Determine the probability that exactly seven claims will be received during a given two-week period.

- (A) $\frac{1}{256}$
- (B) $\frac{1}{128}$
- (C) $\frac{7}{512}$
- (D) $\frac{1}{64}$
- (E) $\frac{1}{32}$

3. The lifetime of a machine part has a continuous distribution on the interval $(0, 40)$ with probability density function f , where $f(x)$ is proportional to $(10 + x)^{-2}$. Calculate the probability that the lifetime of the machine part is less than 6.

- (A) 0.04
- (B) 0.15
- (C) 0.47
- (D) 0.53
- (E) 0.94

4. A group insurance policy covers the medical claims of the employees of a small company. The value, V , of the claims made in one year is described by $V = 100,000Y$ where Y is a random variable with density function

$$f(y) = \begin{cases} k(1 - y)^4, & \text{for } 0 < y < 1, \\ 0, & \text{otherwise} \end{cases}$$

where k is a constant. What is the conditional probability that V exceeds 40,000, given that V exceeds 10,000?

- (A) 0.08
- (B) 0.13
- (C) 0.17
- (D) 0.20
- (E) 0.51

5. A piece of equipment is being insured against early failure. The time from purchase until failure of the equipment is exponentially distributed with mean 10 years. The insurance will pay an amount x if the equipment fails during the first year, and it will pay $0.5x$ if failure occurs during the second or third year. If failure occurs after the first three years, no payment will be made. At what level must x be set if the expected payment made under this insurance is to be 1000 ?

- (A) 3858
- (B) 4449
- (C) 5382
- (D) 5644
- (E) 7235

6. A random variable X has the cumulative distribution function

$$F(x) = \begin{cases} 0, & \text{for } x < 1, \\ \frac{x^2 - 2x + 2}{2}, & \text{for } 1 \leq x < 2, \\ 1, & \text{for } x > 2. \end{cases}$$

Calculate the variance of X .

- (A) $\frac{7}{72}$
- (B) $\frac{1}{8}$
- (C) $\frac{5}{36}$
- (D) $\frac{4}{3}$
- (E) $\frac{23}{12}$