1. You are a new pricing actuary for a Midwest Corn Fields Property and Casualty Insurance Company. Existing homeowners’ insurance has been priced assuming that there is 0.90 probability of no loss, and 0.10 probability of a loss, with the actual loss amount, once a loss occurs, uniformly distributed between $0 and $500,000. The policy has a deductible of $5,000. Upon your arrival you determine that the model for the loss, once it occurs, is incorrect, and that it should have been assumed that such loss is uniformly distributed between $0 and $600,000. Find the amount by which the expected payment under your corrected pricing exceeds the expected payment under the old pricing scheme.
   (A) 1,000 (B) 2,000 (C) 3,000 (D) 4,000 (E) 5,000
   (P305. 16)

2. An American male 100 meters runner is preparing for the 2012 Olympic Games. After repeated runs, he determines that his 100 meters sprint run time is normally distributed with mean 9.88 seconds and standard deviation $\sigma$. He has been also observing his Russian competitor and determined that the Russian’s sprint time is normally distributed with mean 9.99 seconds, and the same standard deviation $\sigma$. Given that the probability that the American beats the Russian is 0.9015, and that their sprint times are independent, determine $\sigma$.
   (A) 0.2512 (B) 0.1025 (C) 0.0875 (D) 0.0603 (E) 0.0499
   [Online 05/06] (P304.15)

3. At a certain insurance company the weights of male and female employees are normally distributed: $N(200, 2500)$ for males, and $N(140, 1600)$ for females (all weights are in pounds, and $N(\mu, \sigma^2)$ stands for a normal distribution with mean $\mu$ and variance $\sigma^2$). A group of ten employees, five males and five females, is being flown from the company headquarters to an office in Iowa in a small company plane, with the plane’s maximum load for passengers being 2000 pounds. What is the probability that the total weight of the passengers exceeds the 2000 pounds limit, assuming that weights of individual employees are independent random variables?
   (A) 0.0668 (B) 0.0526 (C) 0.0409 (D) 0.0250 (E) 0.0181
   (P310.24)

4. The claim amount on a certain insurance contract is modeled by a normal distribution with mean $1,000 and standard deviation $250. Given 10 independent claims, what is the probability that the number of claims less than $1,050 is less than or equal to 2?
   (A) 0.9026 (B) 0.6025 (C) 0.5793 (D) 0.3356 (E) 0.0174
   [Online 08/05] (P330.10)
5. Suppose that U and V are independent random variables, each uniformly distributed on the interval \([100, 200]\). What is the number \(t\) for which the probability that at least one of U and V exceeds \(t\) is 0.25?

\[
(A) 200 - 50\sqrt{3} \quad (B) 150 \quad (C) 175 \quad (D) 100 + 50\sqrt{3} \quad (E) 200 - \left(\frac{1}{4}\right)^2 \cdot 100
\]

[05/82 #2] (P386.6)

6. Let \(X\) and \(Y\) be two independent observations from a uniform distribution defined on the interval \([0, \theta]\). For what value of \(k > 0\) does the probability that both \(X\) and \(Y\) are less than \(k\) equal to the probability that exactly one of the two is less than \(k\)?

\[
(A) \frac{2\theta^2}{2\theta + 1} \quad (B) \frac{\theta}{3} \quad (C) \frac{\theta}{2} \quad (D) \frac{2\theta^3}{3} \quad (E) \frac{2}{3}
\]

[05/82 #41] (P397.25)

7. A point \((X, Y)\) is chosen at random from a uniform distribution on the circular disk of radius 1 centered at the point \((1,1)\). For a given value of \(X\)-x between 0 and 2 and for \(y\) in the appropriate domain, what is the conditional density function for \(Y\)?

\[
(A) \frac{1}{2} \quad (B) \frac{1}{2\sqrt{1-x^2}} \quad (C) \frac{1}{2\sqrt{1-y^2}} \quad (D) \frac{2}{\pi} \sqrt{1-(y-1)^2} \quad (E) \frac{1}{2\sqrt{1-(x-1)^2}}
\]

[05/82 #47] (P411.6)

Answer: EDEED DE