Econ 103 – Quiz 3

Name: _____

Instructions: This is closed-book, closed-notes quiz. Please write your answers in the blanks provided. Each question is worth one point but no partial credit will be awarded. Non-programmable calculators are permitted.

1. (1 point) A continuous random variable X has a probability density function $f(x)$. It is possible that for some value we have $f(x) > 1$. True or false?

   1. _____

2. (1 point) A continuous random variable X has a probability density function $f(x)$. We interpret $f(3)$ as the probability that the random variable takes the value of 3. True or false?

   2. _____

3. (1 point) The random variable X follows a Uniform(0,1) distribution. Write down its probability density function. (Hint - make sure you consider all possible cases for x)

   3. _____

4. (2 points) The random variable X follows a Uniform(0,1) distribution. Write down its CDF, $F(x_0)$. (Hint - make sure you consider all possible cases for x_0)

   4. _____

5. (1 point) The random variable X follows a Uniform(0,1) distribution. What is $P(0.3 \leq X \leq 0.5)$?

   5. _____

6. (2 points) Suppose X follows a Uniform(1,4) distribution. What is $E[X]$?

   6. _____

7. (2 points) Suppose $X \sim N(\mu, \sigma^2)$. What is $P(\mu - 2\sigma \leq X \leq \mu + 2\sigma)$?

7. _____

8. (2 points) Suppose $X_1, X_2, X_3 \sim i.i.d. N(\mu, \sigma^2)$. Let $\bar{X} = (X_1 + X_2 + X_3)/3$. What is the distribution of $\bar{X}$?

8. _____

9. (2 points) Suppose $X_1, X_2, \ldots, X_5 \sim i.i.d. N(0, 1)$. Let $W = X_1^2 + X_2^2 + \ldots + X_5^2$. What is the distribution of W?

9. _____

10. (2 points) Suppose $X_1, X_2, X_3 \sim i.i.d. N(0, 1)$. Let $Y = X_3/\sqrt{(X_1^2 + X_2^2)/2}$. What is the distribution of Y?

10. _____

11. (2 points) Suppose X is a standard normal RV. What is the value of c such that P(c $\leq$ X $\leq$ c) = 0.9? (Write your answer in R command)

11. _____

12. (1 point) Let $Y \sim \chi^2(3)$. What is the 75th-percentile of Y? (Write your answer in R command)

12. _____

13. (1 point) Let $W \sim F(2, 1)$. What is $P(W \leq 4)$? (Write your answer in R command)

13. _____