

LAST NAME (Print): _____ FIRST: _____

Statistics 111 **Quiz 8**

1. Jack and Jill are ahead of you in a checkout line. Jack requires Y minutes, and the total time for both is X minutes, where the joint density of (X, Y)

$$f(x, y) = e^{-(x-5)} \text{ for } 5 < y < x < \infty.$$

What is the marginal density of X ?

The marginal of X is $f_1(x) = \int_5^x e^{-(x-5)} dy = (x-5)e^{-(x-5)}$ for $5 \leq x < \infty$.

What is the conditional density of Y given $X = x$?

The conditional density is $g_2(y | x) = f(x, y)/f_1(x) = 1/(x-5)$ for $5 < y < x$, and 0 else.

0.14 You wait 12 minutes. Find the probability that Jack took less than 6 minutes?

Since Y is uniform on $[5, 12]$, the probability is $(6-5)/(12-5)$.

2. _____ A linear congruential generator is $X_{n+1} = 11X_n + 4 \pmod{7}$. If $X_0 = 2$ what is X_2 ?

X_1 is the remainder when $11 * 2 + 4$ is divided by 7, or 5. So X_2 is the remainder when $11 * 5 + 4$ is divided by 7, or 3.

3. List all, and only, the true statements. **A, C, F, H**

- A. If U is uniform on $[0, 1]$, then $\frac{\ln(1-U)}{-\lambda}$ has an exponential distribution with parameter λ .
- B. The population pyramid for Germany looks short and wide.
- C. Florence Nightingale was a statistician.
- D. There is a low rate of stomach cancer in Hawaii.
- E. William Playfair stopped a cholera epidemic in London.
- F. Napoleon attacked Moscow with 422,000 men, of which only 10,000 returned.

- G. Random sequences can be significantly compressed.
- H. With three fair coin tosses, I can put a uniform distribution on eight objects.
- I. Washington D.C. is a safe place to walk.
- J. A linear congruential generator produces random numbers.