Name: ____________________________

Directions: **Work only on this sheet** (on both sides, if needed); do not turn in any supplementary sheets of paper. There is actually plenty of room for your answers, as long as you organize yourself BEFORE starting writing.

SHOW YOUR WORK!

1. (15) Exercise 7(b), Chapter 4, p.97. Give your answer as a decimal or common fraction.

2. (15) Exercise 8(a), Chapter 4, p.97. Give your answers as decimal or common fractions.

3. (20) Suppose X has a uniform distribution on the interval (20,40), and we know that X is greater than 25. What is the probability that X is greater than 32? Give your answer as a common fraction.

4. (25) Suppose U and V have the 2t/15 density on p.74. Let N denote the number of values among U and V that are greater than 1.5. (CORRECTED SUBSEQUENT TO QUIZ.) (So N is either 0, 1 or 2.) Find Var(N), expressing your answer as a decimal or common fraction.

5. (25) What is the (approximate) value returned from the following R code?

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mean((rnorm(10000,mean=28,sd=5))^4)
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Your answer must be expressed as a definite integral.

Solutions:

1

$$F_X(0.2) = \int_0^{0.2} 2(1-t)\ dt = 0.36$$

$$EX = \int_0^1 t \cdot 2(1-t)\ dt = 1/3$$

2. Let X be the error. On p.75, we have r = 0.5, q = -0.5. Using the formulas for the mean and variance at the bottom of p.75, we have

$$E(X) = (q+r)/2 = 0$$

$$Var(X) = (r-q)^2/12 = 1/12$$

3. Because of the uniformity, $P(a < X < b) = (b-a)/20$. Following the pattern on p.79, we have

$$P(X > 30|X > 25) = \frac{P(X > 30)}{P(X > 25)} = \frac{10/20}{15/20} = 2/3$$

4. N has a binomial distribution with n = 2 and

$$p = \int_{1.5}^{4} 2t/15\ dt = \frac{11}{12}$$

So, (once again) using (3.82), we have

$$Var(N) = 2 \cdot \frac{11}{12} \cdot \frac{1}{12} = \frac{11}{72}$$

5. The simulation is calculating $E(X^4)$, where X has a normal distribution with mean 28 and standard deviation 5. That expected value, by (4.21), is

$$\int_{-\infty}^{\infty} t^4 \cdot \frac{1}{\sqrt{2\pi} \cdot 5}\ e^{-0.5\left(\frac{t-28}{5}\right)^2}\ dt$$