CP Statistics Chapter 6 Practice Free Response-Discrete Random Variables

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X.

X	1	2	3	4	5
P(X)	.1	.2	.3	.3	

   (a) Find P(X = 5).

   (b) Find the probability that the pain score is less than 3.

   (c) Find the probability that the pain score is greater than 3.

   (d) Find the mean μ for this distribution.

2. A quarterback completes 44% of his passes.
   (a) What is the probability that the quarterback takes 4 passes to get his first completion?
   (b) What is the probability that the quarterback throws his first completion in 3 or fewer attempts?
   (c) How many passes, on average, can the quarterback expect to throw before he completes his first pass?

3. A headache remedy is said to be 85% effective in curing headaches caused by simple nervous tension. An investigator tests this remedy on 8 randomly selected patients suffering from nervous tension.
   (a) Find the probability that the remedy works for 7 of the patients.

   (b) Find the probability that the remedy works for more than 6 of the patients.

   (c) Find the probability that the remedy works for less than half of the patients.

   (d) What is the expected value for the number of people in the experiment who have success with the remedy?

CP Statistics Chapter 6 Practice Free Response-ANSWERS

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X. DISCRETE RANDOM VARIABLE

X	1	2	3	4	5
P(X)	.1	.2	.3	.3	

(a) 1 – (.1 + .2 + .3 +.3) = 1 - .9 = .1.

(b) .1 + .2 = .3.

(c) .3 + .1 = .4.

(d) μ = 1(.1) + 2(.2) + 3(.3) + 4(.3) + 5(.1) = 3.1.

2. A quarterback completes 44% of his passes. GEOMETRIC

(a) $P(x=4)=(.56)^3(.44)=.078$

(b) $P(x\le 3)=P(x=1)+P(x=2)+P(x=3)$ =

$P(x=1)=.44,\ P(x=2)=(.56)(.44)=.246,\ P(x=3)=(.56)^2(.44)=.138$

So, $P(x\le 3)=.44+.246+.138=.824$

(c) $\mu=\frac{1}{p}=\frac{1}{.44}=2.273$

3. A headache remedy is said to be 85% effective in curing headaches caused by simple nervous tension. An investigator tests this remedy on 8 randomly selected patients suffering from nervous tension. BINOMIAL

(a) $P(x=7)=\frac{8!}{7!1!}(.85)^7(.15)^1=.385$

(b) $P(x>6)=.657$ (using online binomial calculator)

(c) $P(x<4)=.003$ (using online binomial calculator)

(d) $\mu=np=8(.85)=6.8$