STAT:3510 Biostatistics Midterm 1 Prep

Problem 1

A factory has machines A and B making 60% and 40% respectively of its total production of lightbulbs. 3% of the lightbulbs produced by Machine A and 5% of the lightbulbs produced by Machine B are defective.

a) Write probability statements for the given information.

b) Draw a 2x2 table to illustrate this information.

c) If a lightbulb is found to be defective, what is the probability that it came from Machine A?

Problem 2

A local park has 3 different bike paths. A group of 85 bicyclists was surveyed to determine their preferred bike path at the park. The bicyclists were divided into 3 groups based on their experience level. The results of the survey are summarized in the table below:

	Lake Path	Hilly Path	Wooded Path
Novice	20	6	2
Experienced Recreational	15	12	5
Athlete in Training	2	9	14

a) Fill in the marginal frequencies and determine the marginal distributions for path preferences. Do the same for bicyclist experience level.

b) Determine the conditional distribution of path preferences for athletes in training.

c) What percent of bicyclists surveyed are novices?

d) What percent of experienced recreational bicyclists preferred the lake path?

e) What percent of bicyclists surveyed are athletes in training and preferred the hilly path?

Problem 3

It has been discovered that about 18% of the clocks that a company produces are defective. From a large outgoing shipment of clocks, suppose that you choose 5 clocks at random. Create a probability distribution table for the number of defective clocks in the sample.

P(X=0)	P(X=1)	P(X=2)	P(X=3)	P(X=4)	P(X=5)

a) What is the probability of finding at least 2 defective clocks in the sample of 5?

b) How many defective clocks would one expect to find in a batch of 5?

c) Determine the standard deviation for this probability distribution.

Problem 4

Compute each of the following probabilities for a standard normal distribution.

a) $P(Z \leq 0.78)$

b) $P(Z \leq -1.12)$

c) $P(Z \geq -2.06)$

d) $P(-0.85 \leq Z \leq 1.33)$

Problem 5

Find the corresponding z values

a) Find z if $P(Z \leq z) = 0.59$

b) Find z if $P(Z \leq z) = 0.31$

c) Find z if $P(Z \geq z) = 0.82$