gw8 answers

1. The probability a student arrives late to class is 20% on Monday and 10% on Tuesday. Assume being late on these days are independent events.

   a. Find the probability the student is late both Monday and Tuesday.

      (.2)(.1)=.02=2%

   b. Find the probability the student is late either Monday or Tuesday (or both days).

      .2+.1-.02=.28 = 28%

3. 1% of the population of a country has disease X. A test for the disease has been developed that has a 95% of correctly detecting the disease (true positive). However, the test will come out positive in 2% of people who do not have disease X (false positive).

   a. Construct a tree diagram where the first set of branches are people with and without the disease, and the 2nd set is whether or not they test positive.

   b. From the tree diagram create a contingency table.

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            /        \
      .01 /            \ .99
      (D+)             (D-)
       /  \            /  \
.95 /      \ .05  .02/     \ .98
 (T+)   (T-)      (T+)    (T-)
.0095  .0005    .0198  .9702
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	T+	T-	total
D+	95	5	100
D-	198	9702	9900
total	293	9707	10000

P(D+|T+) = 95/293=32.4%

   c. What percentage of the population will test positive for disease X? **2.93%**

   d. If a person tests positive, what is the probability that the person really has disease X?

      .0095/.0293=32.4%

Math 10 – Discrete Random Variables KEY

1. Explain the difference between population parameters and sample statistics. What symbols do we use for the mean and standard deviation for each of these?

2. Consider the following probability distribution function of the random variable X which represents the number of people in a group(party) at a restaurant:

X	P(X)	$xP(x)$	$x-\bar{x}$	$(x-\bar{x})^2$	$(x-\bar{x})^2P(x)$
1	.10	.1	-2.55	6.5025	~~.6.5025~~ .65025
2	.25	.5	-1.55	2.4025	.600625
3	.20	.6	-0.55	.3025	.0605
4	.20	.8	.45	.2025	.0405
5	.10	.5	1.45	2.1025	.21025
6	.05	.3	2.45	6.0025	.300125
7	.05	.35	3.45	11.9025	.595125
8	.05	.4	4.45	19.8025	.990125
		3.55			3.4475

a. Find the population mean of X.

$\mu = 3.55$

b. Find the population variance and standard deviation of X.

$\sigma^2 = 3.45$

$\sigma = \sqrt{3.45} = 1.86$

c. Find the probability that the next three parties (assuming independence) will all be over 4.

$P(x>4) = .25$

$(P(x>4))^3 = .015625$