

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).

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

2. 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 2<sup>nd</sup> set is whether or not they test positive.
- b. From the tree diagram create a contingency table.

<pre>           /      \     .01 /          \ .99     (D+)            (D-)      / \          /  \     .95 /   \ .05 .02 /   \ .98     (T+) (T-) (T+) (T-)     .0095 .0005 .0198 .9702                 </pre>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>T+</th> <th>T-</th> <th>total</th> </tr> </thead> <tbody> <tr> <th>D+</th> <td style="text-align: center;">95</td> <td style="text-align: center;">5</td> <td style="text-align: center;">100</td> </tr> <tr> <th>D-</th> <td style="text-align: center;">198</td> <td style="text-align: center;">9702</td> <td style="text-align: center;">9900</td> </tr> <tr> <th>total</th> <td style="text-align: center;">293</td> <td style="text-align: center;">9707</td> <td style="text-align: center;">10000</td> </tr> </tbody> </table> <p style="text-align: center;"><math>P(D+   T+) = 95/293=32.4\%</math></p>		T+	T-	total	D+	95	5	100	D-	198	9702	9900	total	293	9707	10000
	T+	T-	total														
D+	95	5	100														
D-	198	9702	9900														
total	293	9707	10000														

- 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%**