Probability Theory and Statistics

Sample Test

1. 13 card is selected without replacement from a pack of French (52) playing cards. Find the probability of selecting at most 1 queen.

2.A math teacher gave her class two tests. 25% of the class passed both tests and 42% of the class passed the first test. What is the probability that someone passed the first test if we know that they passed the second test?

3. A machine is known to produce, on average, 2% defective components.

(a) What is the probability that exactly 3 are defective among the next 20 components?

(b) What is the expected value of the defective components among the next 200?

4. Suppose a disease randomly found with probability 1% in young population, 4% in middle-aged population, and 12% in old population. 25% of population is young, 45% is middle-aged and 30% is old. How large is the probability that a randomly chosen infected person is young?

5.Suppose an individual plays a gambling game where it is possible to lose \$1.00, break even, win \$3.00, or win \$10.00 each time she plays. The probability distribution for each outcome is provided by the following table:

Outcome	-1\$	0\$	3\$	10\$
Probability	0.2	0.3	0.4	0.1

(a) Compute the expected value and the standard deviation of the payoff!

(b) Assume that the player has the chance to play once more for free before leaving the casino, where she can win \$3.00 with probability 0.01 or \$0.00 otherwise, independently from the outcome of the previous gambling game. Compute the variance of the total winning in the two games.