Suzhou's Traditional Gardens Visitor Problem

Suzhou, a city in Jiangsu, China, is renowned for its traditional gardens. Let's say that on any given day, there's a 15% chance that a resident of Suzhou visits one of these gardens.

If a random sample of 100 residents is taken:

a) What is the probability that exactly 20 residents have visited a traditional garden on that day?
b) What is the expected number of residents who have visited a traditional garden?
c) What is the variance and standard deviation of the number of residents who have visited a traditional garden?
d) If another sample of 100 residents is taken, what is the probability that at least 25 residents have visited a traditional garden?

Use the binomial distribution formula to solve the problem.

Suzhou Industrial Park (SIP) Manufacturing Problem

Suzhou Industrial Park (SIP) is a major industrial hub in Suzhou, China. Among the many companies located in SIP, a significant number are electronics manufacturers. Let's say that on any given day, there's a 10% chance that a manufacturing unit in SIP produces a defective electronic item due to a specific issue in the production line.

If a random sample of 50 electronic items is taken from a particular manufacturing unit:

a) What is the probability that exactly 5 items are defective?
b) What is the expected number of defective items in the sample?
c) What is the variance and standard deviation of the number of defective items in the sample?
d) If another sample of 50 electronic items is taken, what is the probability that at most 3 items are defective?

Use the binomial distribution formula to solve the problem.