

2-41. A lot of 140 semiconductor chips is inspected by choosing a sample of five chips. Assume 10 of the chips do not conform to customer requirements.

- How many different samples are possible?
- How many samples of five contain exactly one nonconforming chip?
- How many samples of five contain at least one nonconforming chip?

(a) The lot size is 140, the sample size is  $\bar{5}$

$$\binom{140}{5} = 416,965,528$$

(b) How many samples contain 4 good and 1 bad chip:

$$\binom{130}{4} \binom{10}{1} = 113,588,800$$

(c) How many samples contain:

(4 good and 1 bad) or (3 good and 2 bad) or (2 good and 3 bad) or ...  
... (1 good and 4 bad) or (0 good and 5 bad)

$$= \binom{130}{4} \binom{10}{1} + \binom{130}{3} \binom{10}{2} + \binom{130}{2} \binom{10}{3} + \binom{130}{1} \binom{10}{4} + \binom{130}{0} \binom{10}{5}$$

$$= 113,588,800 + 16,099,200 + 1,006,200 + 27,300 + 252$$

$$= 130,721,752$$