No. Chapter 5B

1 If 6 cards are dealt from an ordinary deck of 52 playing cards, what is the probability that:

a) exactly 3 of them will be face cards? For your viewing pleasure.

N = 52 n = 6 k = 12

x = 3

$$h(x;N,n,k) = \frac{\left\{\frac{k!}{x!(k-x)!}\right\}\left\{\frac{(N-k)!}{(n-x)!\left[(N-k)-(n-x)\right]!}\right\}}{\frac{N!}{n!(N-n)!}}$$

$$h(3, 52, 6, 12) = \frac{\frac{12!}{3!\,(12-3)!}\;\frac{(52-12)!}{(6-3)!\;\;[(52-12)-(6-3)]!}}{\frac{52!}{6!\,(52-6)!}}$$

$$= \frac{220 \quad 9880}{20358520} = \boxed{0.107}$$

b) at least 3 of them will be a queen? For your viewing pleassure.

x ≥ 3 N = 52 n = 6 k = 4

P(Queen ≥ 3) = h(x=3, 52, 6, 4) + h(x=4, 52, 6, 4)

$$h(x;N,n,k) = \frac{\left\{\frac{k!}{x!(k-x)!}\right\}\left\{\frac{(N-k)!}{(n-x)!\left[(N-k)-(n-x)\right]!}\right\}}{\frac{N!}{n!(N-n)!}}$$

x = 3

$$h(3, 52, 6, 4) = \frac{\frac{4!}{3!\,(4-3)!}\;\frac{(52-4)!}{(6-3)!\;[(52-4)-(6-3)]!}}{\frac{52!}{6!\,(52-6)!}}$$

$$= \frac{4 \quad 17296}{2E+07} = 0.0034$$

x = 4

$$h(2, 52, 6, 4) = \frac{\frac{4!}{4!\,(4-4)!}\;\frac{(52-4)!}{(6-4)!\;[(52-4) \quad 0}}{\frac{52!}{6!\,(52-6)!}}$$

$$= \frac{1 \quad 1128}{2E+07} = 6E\text{-}05$$

P(Queen ≥ 3) = 0.003 + 0.000 = **0.003**

2 A smuggler places 3 narcotic tablets in a bottle of 21 vitamin pills for a total of 24 pills. If U.S. customs tests 2 pills at random what is the probability that at least 1 narcotic pill will be found?

x = k = N = n = Vitamin =

3 A random committee of size 4 is selected from 4 doctors and 5 nurses. What is the probability that exactly 2 doctors will be selected.

N = 9 x = 2 n = 6 k = 4

$$h(x;N,n,k) = \frac{\left\{\frac{k!}{x!(k-x)!}\right\}\left\{\frac{(N-k)!}{(n-x)!\left[(N-k)-(n-x)\right]!}\right\}}{\frac{N!}{n!(N-n)!}}$$

$$h(2, 9, 6, 4) = \frac{\frac{4!}{2!\,(4-2)!}\;\frac{(9-4)!}{(6-2)!\;\;[(9-4)\;-(6-2)]!}}{\frac{9!}{6!\,(9-6)!}}$$

$$= \frac{6}{84}\;\frac{5}{} = 0.3571$$

4 A company is interested in evaluating its current inspection procedure on shipments of 20 identical items. They take a sample of 5 and accept the shipment if no more than the allowed maximum of the samples are found to be defective. Those that do not pass are directed back to the vendor. What proportion of shipments that have 10% defectives will be wrongly accepted?

k = 10% * 20 = 2

a) If the allowed maximum = 0 (i.e., $x \leq 0$)

b) What is the probability that sampling from a shipment will discover exactly 1 defect?

c) What is the probability that sampling from a shipment will discover fewer than 2 defects ?

(d) What is the probability that sampling from a given shipment will discover 2 or more defects ?

5 Person dealt 13 cards from an ordinary deck of 52 cards several times. On average, how many hearts can he expect? What is the variance of the number of hearts?

6 An annexation suit is being considered against a county subdivision of 600 residences by a neighboring city. If 40% of the residents favor being annexed and if a random sample of 15 will be collected,

(a) Demonstrate whether it is acceptable to use the bionomial approximation.

(b) What is the probability that at least 5 of those sampled will favor the annexation suit?

7 60% of 200 seniors disapprove of pot. If 16 are selected at random, what is the probability that more than 5 but fewer than 10 seniors disapprove?

8 A foreign student club lists its members: 2 Canadians, 3 Japanese, 5 Italians, 2 Germans. If 4 are selected at random,

a) find the probability that all 3 nationalities are represented.
Not assigned

$$h(x_1, x_2, x_3, x_4; 2, 3, 5, 2) = \frac{\binom{2}{1}\binom{3}{1}\binom{5}{1}\binom{2}{1}}{\binom{12}{4}}$$

$$= \frac{2 * 3 * 5 * 2 =}{495} \qquad \underline{\mathbf{0.121}}$$

b) all except Italians represented Not assigned

P(not Italians) = sum of prob that some other nationality is represented twice

$$P(no\ Italians) = \frac{\binom{2}{2}\binom{3}{1}\binom{2}{1}}{\binom{12}{4}} + \frac{\binom{2}{1}\binom{3}{2}\binom{2}{1}}{\binom{12}{4}} + \frac{\binom{2}{1}\binom{3}{1}\binom{2}{2}}{\binom{12}{4}}$$

$$= \underline{1 * 3 * 2 + 2 * 3 * 2 + 2 * 3 * 1} = \underline{\mathbf{0.048}} = \underline{\mathbf{8/165}}$$

1 a) 0.107

1 b) 0.3%

2 24%

3 0.357

4 a) 0.553

4 b) 0.395

4 c) 94.7%

4 (d) 5.3%

5 2.25

1.19

6 (b) 0.783

0.454

8 a) 0.121

8 b)