MATH 1105 - FALL 2008 - 10-15-08
SECTION 2
IN-CLASS PROBLEMS

(1) A committee of 6 people is chosen out of 20 people, and a chairperson is assigned.

a. How many ways are there to choose this committee and select a chairperson?
$6\binom{20}{6}$

b. Jim is one these 20 people. What is the probability that Jim is on the committe and is not the chairperson?
$\frac{5\binom{19}{5}}{6\binom{20}{6}}$

(2) Consider a normal deck of playing cards.

a. How many different hands of five cards can make up a full house?
$13\binom{4}{3}12\binom{4}{2}$

b. Given that a hand of five cards is a full house, what is the probability that the 8 of diamonds is in the hand?
$\frac{\binom{3}{2}12\binom{4}{2}+12\binom{4}{3}\binom{3}{1}}{13\binom{4}{3}12\binom{4}{2}}$

(3) A class of 30 students is split into six groups of 5 and within each group a spokesperson and a scribe are chosen, and these must be different people.

a. How many different ways are there to assign groups and jobs?
$\frac{P(5,2)\binom{30}{5}P(5,2)\binom{25}{5}P(5,2)\binom{20}{5}P(5,2)\binom{15}{5}P(5,2)\binom{10}{5}P(5,2)\binom{5}{5}}{6!}$

b. Tammy and Jill like to be in the same group. What is the probability that Tammy and Jill are in the same group and one of them is the spokesperson in that group?
$\frac{\frac{\binom{2}{1}\binom{4}{1}\binom{28}{3}P(5,2)\binom{25}{5}P(5,2)\binom{20}{5}P(5,2)\binom{15}{5}P(5,2)\binom{10}{5}P(5,2)\binom{5}{5}}{5!}}{\frac{P(5,2)\binom{30}{5}P(5,2)\binom{25}{5}P(5,2)\binom{20}{5}P(5,2)\binom{15}{5}P(5,2)\binom{10}{5}P(5,2)\binom{5}{5}}{6!}}$

(4) A committee of n people is chosen out of a set of 10 people. If the probability that Bob is on the committee is .4, then what is n?

Probability $= \frac{\binom{9}{n-1}}{\binom{10}{n}} = \frac{\frac{9!}{(n-1)!(10-n)!}}{\frac{10!}{n!(10-n)!}} = \frac{n}{10} = .4.$
So, $n = 4$.