

## Ceng272 -Exercise Set 5

5.5 According to *Chemical Engineering Progress* (Nov. 1990), approximately 30% of all pipework failures in chemical plants are caused by operator error.

- (a) What is the probability that out of the next 20 pipework failures at least 10 are due to operator error?
- (b) What is the probability that no more than 4 out of 20 such failures are due to operator error?
- (c) Suppose, for a particular plant, that out of the random sample of 20 such failures, exactly 5 are operational errors. Do you feel that the 30% figure stated above applies to this plant? Comment.

**5.10** A nationwide survey of seniors by the University of Michigan reveals that almost 70% disapprove of daily pot smoking, according to a report in *Parade*. If 12 seniors are selected at random and asked **their** opinion, find the probability that the **number** who disapprove of smoking pot daily is

- (a) anywhere from 7 to **9**;
- (b) at most 5;
- (c) not less than 8.

**5.15** It is known that 60% of mice inoculated with a serum are protected from a certain disease. If 5 mice are inoculated, find the probability that

- (a) none contracts the **disease**;
- (b) fewer than 2 contract the disease;
- (c) more than 3 contract the disease.

**5.29** If 7 cards are dealt from an ordinary deck of 52 playing cards, what is the probability that

(a) exactly 2 of them will be face cards?

(b) at least 1 of them will be a queen?

**5.31** A homeowner plants 6 bulbs selected at random from a box containing 5 tulip bulbs and 4 daffodil bulbs. What is the probability that he planted 2 daffodil bulbs and 4 tulip bulbs?

5.45 A foreign student club lists as its members 2 Canadians, 3 Japanese, 5 Italians, and 2 Germans. If a committee of 4 is selected at random, find the probability that

(a) all nationalities are represented;

(b) all nationalities except the Italians are represented.

**5.52** A scientist inoculates several mice, one at a time, with a disease germ until he finds 2 that have contracted the disease. If the probability of contracting the disease is  $1/6$ , what is the probability that 8 mice are required?

**5.59** A secretary makes 2 errors per page, on average. What is the probability that on the next page he or she will make

(a) 4 or more errors?

(b) no errors?