Problems

Question 1. A packet of seeds contains four seeds that produce white flowers and six seeds that produce pink flowers. Four seeds are to be randomly selected without replacement. Find the probability that:

a) Exactly three of the selected seeds produce pink flowers.

b) At least three of the selected seeds produce pink flowers.

c) All four selected seeds produce flowers of an identical color.

Question 2. Of 30 rats in a cage, 16 are males and 15 are infected with a virus that causes hemorrhagic fever. Of the 16 male rats, 9 are infected with the virus. One rat is randomly selected from the cage.

a) What is the conditional probability that the rat is female, given that it is not found to be infected?

b) What is the conditional probability that the selected rat is not infected, given that it is male?

Question 3. Let A and B denote any two events and suppose that the following probabilities are given.

$$P(A) = \frac{1}{3} \qquad P(B \,|\, A) = \frac{1}{2} \qquad P(B \,|\, A^c) = \frac{1}{4}$$

Answer the following:

a) What is $P(A \cap B)$?

b) Are A and B independent? Explain your answer.

c) Are A and B mutually exclusive? Explain your answer.

Question 4. The probability is 0.116 that an audit of a retail business will turn up irregularities in the collection of state sales tax. If 16 retail businesses are audited, defining

a suitable random variable, find the expressions for the probability that

(a) exactly 5 will have irregularities in the collection of state sales tax.

(b) at least 1 will have irregularities in the collection of state sales tax.

(c) fewer than 5 will have irregularities in the collection of state sales tax.

(d) at most 5 will have irregularities in the collection of state sales tax.

(e) more than 5 will have irregularities in the collection of state sales tax.

(f) no more than 5 will have irregularities in the collection of state sales tax.

(g) no fewer than 5 will have irregularities in the collection of state sales tax