AMS 102: QUIZ 3

SOLUTIONS

1. The probability that a rabbit carries a gene for long hair is 0.2. Two rabbits are chosen (the choice of one rabbit is independent of the choice of the other).

(a) What is the probability that neither of the two rabbits carry the long-hair gene?

The probability that a rabbit does not carry the long-hair gene is $1-0.2 = 0.8$.

The probability that neither of two independently selected rabbits do not carry the gene is $0.8 \times 0.8 = 0.64$.

(b) What is the probability that at least one rabbit carries the long-hair gene?

The probability is $1 - P(\textit{neither of two rabbits carries the gene}) = 1 - 0.64 = 0.36$.

2. The probability that a rabbit has long hair and short ears is 0.1, long hair and long ears 0.1, and short hair and short ears 0.3.

(a) What is the probability that a randomly selected rabbit has short hair and long ears?

The probability is $1 - (0.1 + 0.1 + 0.3) = 0.5$.

(b) Given that a rabbit has short ears, what is the probability that this rabbit has long hair?

The probability that a rabbit has short ears is $0.1 + 0.3 = 0.4$. *The probability that a rabbit has short ears and long hair is* 0.1. *Therefore, the probability that a short-eared rabbit has long hair is* $\dfrac{0.1}{0.4} = \dfrac{1}{4} = 0.25$.