

NCERT/CBSE MATHEMATICS CLASS 12 textbook

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MISCELLANEOUS EXERCISES

Answers to NCERT/CBSE MATH (Class XII) textbook

Chapter 13

PROBABILITY

3. Suppose that 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females.

SOLUTION:

Let M: a male is selected

Let F a female is selected

Let G: a grey haired person is selected

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$$P(M|G) = \frac{P(G|M)P(M)}{P(G|M)P(M) + P(G|F)P(F)}$$

$$\text{Now, } P(G|M) = 5\% = \frac{5}{100} = \frac{1}{20}$$

$$P(G|F) = 0.25\% = \frac{.25}{100} = \frac{1}{400}$$

$$\text{and } P(M) = P(F) = \frac{1}{2}$$

Substituting,

$$P(M|G) = \frac{P(G|M)P(M)}{P(G|M)P(M) + P(G|F)P(F)}$$

$$= \frac{\frac{1}{20} \cdot \frac{1}{2}}{\frac{1}{20} \cdot \frac{1}{2} + \frac{1}{400} \cdot \frac{1}{2}}$$

$$= \frac{\frac{1}{20}}{\frac{1}{20} + \frac{1}{400}}$$

$$= \frac{\frac{1}{20}}{\frac{20}{21}} = \frac{20}{21}$$

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