

Exercise walk-through

14.1

Data analysis: spread, weighted averages and conditional probability

GRE · GRE · GRE General Test

7. Read the evidence and choose a method

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For equally likely discrete outcomes, probability is favourable count over total count. Conditional probability restricts the denominator to the given condition. Without replacement changes later counts. Overlapping events need subtraction of the overlap when counting a union. Independence must be given or justified; it is not the same as mutually exclusive.

13. Model and reasoning

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The combined total is $12(5) + 8(10) = 140$ across twenty observations, so mean is seven. An unweighted average of five and ten would incorrectly ignore group sizes. In the second data set, sum is thirty, mean six, median three and range nineteen. Adding seven shifts all values and their mean together; every deviation from the mean is unchanged, so standard deviation is unchanged.

15. Reasoning and check

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Conditioning on art gives $P(M | A) = 10/24 = 5/12$. The union count is $24 + 18 - 10 = 32$, so union probability is $4/5$. Independence would require $P(A \cap M) = P(A)P(M)$, but $10/40 = 1/4$ differs from $(24/40)(18/40) = 27/100$. The events are not independent. Scaling every deviation by -3 scales its square by nine and the square root by three, so standard deviation triples. It cannot become negative.

Exercise 2.1

2.1 Group A has 12 observations with mean 5; group B has eight with mean 10. Find the combined mean. For the data 1,2,3,4,20 find mean, median and range. Describe how adding 7 to every value changes the standard deviation.

3 Exam-style questions

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3.1 Of 40 students, 24 study art, 18 study music and 10 study both. Find the probability of music given art and the probability of at least one subject. Are the events independent? Then explain what happens to standard deviation if all measurements are multiplied by -3.

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Local review checklist: follow every response instruction; support the answer with the stated evidence; explain rejected alternatives or an opposing view; check scope, restrictions and clarity. For writing, this is a formative checklist, not an official rubric score.