

Solutions

2.1 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.

3.1 Conditioning on art gives $P(M \mid A) = 10/24 = 5/12$. 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.

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.