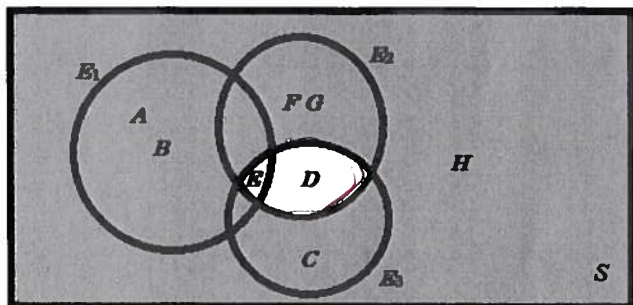


1) The following Venn diagram applies to events E_1 , E_2 , and E_3 in the sample space S , along with outcomes and their associated probabilities.



$$P(A) = 0.086$$

$$P(B) = 0.044$$

$$P(C) = 0.172$$

$$P(D) = 0.001$$

$$P(E) = 0.502$$

$$P(F) = 0.058$$

$$P(G) = 0.111$$

$$P(H) = 0.026$$

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What set operation is shaded on the above Venn diagram? Write the operation using proper notation and determine the resulting probability.

$$(E_2 \cap E_3)'$$

(+3)

$$P((E_2 \cap E_3)') = P\{A B C F G H\}$$

(+1)

$$= 0.086 + 0.044 + 0.172 + 0.058 + 0.111 + 0.026$$

$$= 0.497$$

(+1)

alt:

$$= 1 - P(E_2 \cap E_3)$$

$$= 1 - P\{D E\}$$

$$= 1 - (0.001 + 0.502) = 0.497$$

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2) Bob Jones just measured the following resistances in $m\Omega$ (milliohms) on a proprietary subassembly:

{45.4 45.4 45.7 45.7 45.7 45.7 45.7 45.9 46.0}

Compute the sample mean, sample variance, sample standard deviation, and sample range. Include a unit with each answer.

Hint: $s^2 = \frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}$

$$\bar{X} = \frac{\sum x_i}{n} = \frac{411.2}{9} = 45.69 \quad m\Omega$$

$$s^2 = \frac{18787.58 - \frac{411.2^2}{9}}{8} = 0.03861 \quad (m\Omega)^2$$

$$s = \sqrt{s^2} = 0.1965 \quad m\Omega$$

$$r = 46.0 - 45.4 = 0.6 \quad m\Omega$$

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What is the difference between the VAR.S and VAR.P formulae in Excel, what would you find in each denominator, and which formula would you use in this problem?

VAR.S \rightarrow sample variance \rightarrow $n-1$ in denominator

VAR.P \rightarrow population variance \rightarrow n in denominator

we would use VAR.S

Draw a histogram that displays the relative frequency distribution of resistances. Choose the number of bins and bin width appropriately. Label all axes.

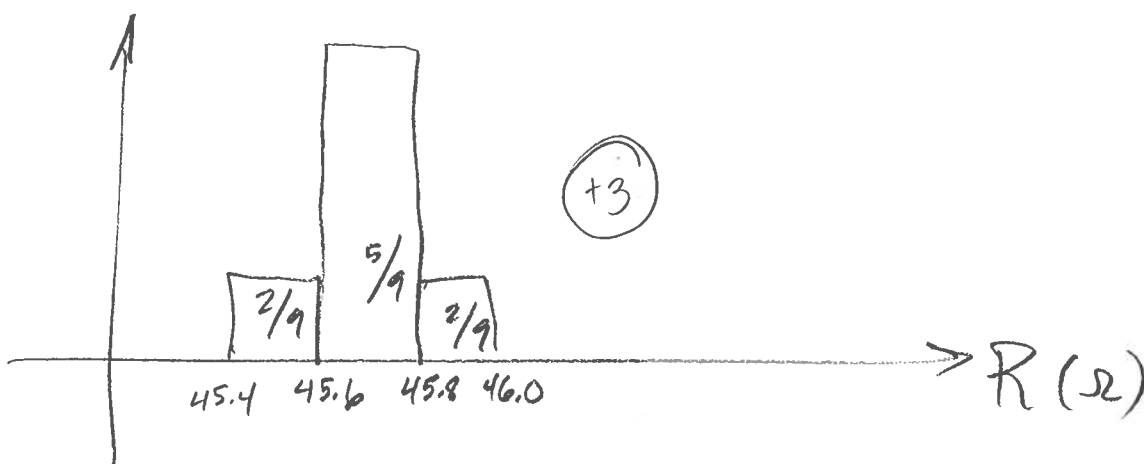
$$\text{bins} = \sqrt{n} = \sqrt{9} = \underline{3} \quad (+1)$$

$$\text{equal bin width : } \frac{\text{range}}{3} = \frac{46.0 - 45.4}{3} = \underline{0.2} \quad (+1)$$

∴ bin 1 :	45.4 - 45.6	} (+1)	45.4	2
bin 2 :	45.6 - 45.8		<u>45.4</u>	
bin 3 :	45.8 - 46.0		45.7	
			45.7	5
			45.7	
			45.7	
			<u>45.7</u>	2
			45.9	
			46.0	

∴ relative frequencies are

$$\frac{2}{9}, \frac{5}{9}, \frac{2}{9} \quad (+1)$$



∴ other bin widths acceptable w/ detailed rationale!