

Answer on Question #75936 – Math – Statistics and Probability

Question

The variation of the specific heat capacity of air with temperature is given in the following set of data:

Heat Capacity (in kJ kg⁻¹ K⁻¹) 1.003 1.005 1.008 1.013 1.020 1.029

Temperature (in K) 250 300 350 400 450 500

Compute the correlation coefficient r_{XY}.

Solution

	x	y	x^2	y^2	xy
	1.003	250	1.0060	62500	250.75
	1.005	300	1.0100	90000	301.50
	1.008	350	1.0161	122500	352.80
	1.013	400	1.0262	160000	405.20
	1.020	450	1.0404	202500	459.00
	1.029	500	1.0588	250000	514.50
Sum	6.078	2250	6.1575	887500	2283.75

$$r_{xy} = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}} = \frac{6 \cdot 2283.75 - 6.078 \cdot 2250}{\sqrt{6 \cdot 6.1575 - 6.078^2} \sqrt{6 \cdot 887500 - 2250^2}} = 0.9680.$$

Answer: 0.9680.

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