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Problem Set-9

Q.1) It is important that scientific researchers in the area of forest products be able to study correlation among the anatomy and mechanical properties of trees. For the study Quantitative Anatomical Characteristics of Plantation Grown Loblolly Pine (Pinus Taneda L.) and Cottonwood (Populus deltoids Bart. Ex Marsh.) and Their Relationships to Mechanical Properties, conducted by the Department of Forestry and Forest Products at Virginia Tech, 29 loblolly pines were randomly selected for investigation. Table shows the resulting data on the specific gravity ingrams/cm3 and the modulus of rupture in kilopascals (kPa). Compute and interpret the sample correlation coefficient.

Specific Gravity, x (g/cm^3)	Modulus of Rupture, y (kPa)	Specific Gravity, x (g/cm^3)	Modulus of Rupture, y (kPa)
0.414	29,186	0.581	85,156
0.383	29,266	0.557	69,571
0.399	26,215	0.550	84,160
0.402	30,162	0.531	73,466
0.442	38,867	0.550	78,610
0.422	37,831	0.556	67,657
0.466	44,576	0.523	74,017
0.500	46,097	0.602	87,291
0.514	59,698	0.569	86,836
0.530	67,705	0.544	82,540
0.569	66,088	0.557	81,699
0.558	78,486	0.530	82,096
0.577	89,869	0.547	75,657
0.572	77,369	0.585	80,490
0.548	67,095		

Ans: > x = c(0.414, 0.383, 0.399, 0.402, 0.442, 0.422, 0.466, 0.500, 0.514, 0.530, 0.569, 0.558, 0.577, 0.572, 0.548, 0.581, 0.557, 0.550, 0.531, 0.550, 0.556, 0.523, 0.602, 0.569, 0.544, 0.557, 0.530, 0.547, 0.585)

> y = c(28186, 29266, 26215, 30162, 38867, 37831, 44576, 46097, 59698, 67705, 66088, 78486, 89869, 77369, 67095, 85156, 69571, 84160, 73466, 78610, 67657, 74017, 87291, 86836, 82540, 81699, 82096, 75657, 80490)

> cor(x,y)

[1] 0.9434695

```
> x = c(0.414, 0.383, 0.399, 0.402, 0.442, 0.422, 0.466, 0.500, 0.514, 0.530, 0.569, 0.558, 0.577, 0.572, 0.548, 0.581, 0.557, 0.550
> y = c(28186, 29266, 26215, 30162, 38867, 37831, 44576, 46097, 59698, 67705, 66088, 78486, 89869, 77369, 67095, 85156, 69571, 84160
> cor(x,y)
[1] 0.9434695
>
```

Q.2) Compute and interpret the correlation coefficient for the following grades of 6 students selected at random:

Mathematics grade	70	92	80	74	65	83
English grade	74	84	63	87	78	90

Ans

> x2 = c(70, 92, 80, 74, 65, 83)

> y2 = c(74, 84, 63, 87, 78, 90)

> cor(x2,y2)

[1] 0.2396639

```
> x2 = c(70, 92, 80, 74, 65, 83)
> y2 = c(74, 84, 63, 87, 78, 90)
> cor(x2,y2)
[1] 0.2396639
>
```

Q.3) Assume that x and y are random variables with a bivariate normal distribution. Calculate r.

Individual	Strength, x	Lift, y
1	17.3	71.7
2	19.3	48.3
3	19.5	88.3
4	19.7	75.0
5	22.9	91.7
6	23.1	100.0
7	26.4	73.3
8	26.8	65.0
9	27.6	75.0
10	28.1	88.3
11	28.2	68.3
12	28.7	96.7
13	29.0	76.7
14	29.6	78.3
15	29.9	60.0
16	29.9	71.7
17	30.3	85.0
18	31.3	85.0
19	36.0	88.3
20	39.5	100.0
21	40.4	100.0
22	44.3	100.0

Ans

> x3 = c(17.3, 19.3, 19.5, 19.7, 22.9, 23.1, 26.4, 26.8, 27.6, 28.1, 28.2, 28.7, 29.0, 29.6, 29.9, 29.9, 30.3, 31.3, 36.0, 39.5, 40.4, 44.3, 44.6, 50.4, 55.9)

> y3 = c(71.7, 48.3, 88.3, 75.0, 91.7, 100.0, 73.3, 65.0, 75.0, 88.3, 68.3, 96.7, 76.7, 78.3, 60.0, 71.7, 85.0, 85.0, 88.3, 100.0, 100.0, 100.0, 91.7, 100.0, 71.7)

> cor(x3,y3)

[1] 0.3916965

```
> x3 = c(17.3, 19.3, 19.5, 19.7, 22.9, 23.1, 26.4, 26.8, 27.6, 28.1, 28.2, 28.7, 29.0,
> y3 = c(71.7, 48.3, 88.3, 75.0, 91.7, 100.0, 73.3, 65.0, 75.0, 88.3, 68.3, 96.7, 76.7
> cor(x3,y3)
[1] 0.3916965
>
```