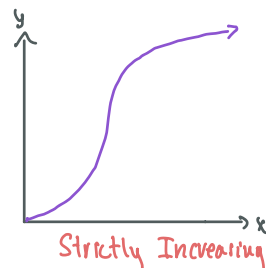


Testing For Validity

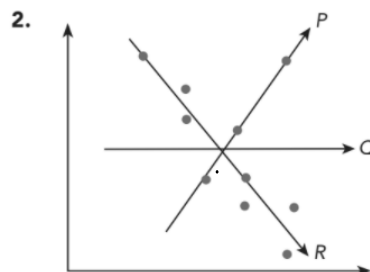
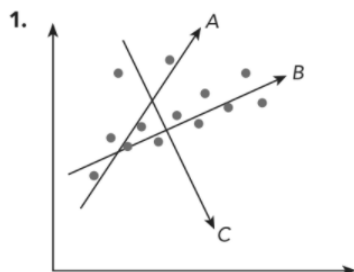
Monotonic Function - a function that is strictly increasing or strictly decreasing.

★ a function whose slope NEVER changes sign



Pearson's CC wouldn't be very helpful since this data is Non-Linear

State the line that represents the line of best fit for each scatter plot.



Spearman's Rank Correlation Coefficient r_s

- a measure of the Non-linear and Monotonic correlation between two variables x and y .

ex) Consider the data below:

Burger	A	B	C	D	E	F	G	H	I
Taste Rank	7	3	4	6	1	9	2	5	8
Cost (\$)	3.50	7.45	6.50	4.50	8.50	2.65	3.95	4.35	1.45

* Pearson's cannot be used because Ranks are given rather than quantifiable data (ie. Frequencies)

Find Spearman's Rank Correlation Coefficient

Step 1: Rank your data (in this example, we need to rank cost)

Taste	Cost	Ranked	
Taste	Cost	Taste	Cost
7	3.50	7	7
3	7.45	3	2
4	6.50	4	3
6	4.50	6	4
1	8.50	1	1
9	2.65	9	8
2	3.95	2	6
5	4.35	5	5
8	1.45	8	9

The highest cost is Ranked 1
 The next highest cost is Ranked 2
 ...
 The lowest cost is Ranked 9

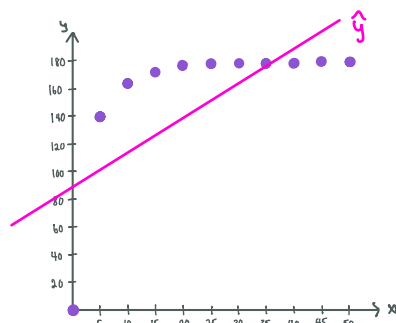
Step 2: Follow [Calc] Correlation Coefficient Steps to find r_s
 Just like we did with Pearson's, just now we input Ranked data

L1	L2
7	7
3	2
4	3
6	4
1	1
9	8
2	6
5	5
8	9

→ Lin Reg ($a+bx$) → $r_s = 0.8$

ex) Consider the data below:

Minutes (x)	0	5	10	15	20	25	30	35	40	45
Oven Temp (y°C)	0	140	165	175	180	180	180	180	180	180



Exponential

@ Calculate Spearman's Rank CC

		Ranked	
Mins	Temp	Mins	Temp
0	0	10	10
5	140	9	9
10	165	8	8
15	175	7	7
20	180	6	3.5
25	180	5	3.5
30	180	4	3.5
35	180	3	3.5
40	180	2	3.5
45	180	1	3.5

When values repeat (180, 180, ..., 180)
Our Rank for those values is
the average of all their Ranks
 $= \frac{(6+5+4+3+2+1)}{6} = 3.5$

→ Lin Reg ($a+bx$) → $r_s = 0.88$

ex) Rank this data set and find Spearman's CC

# of Pets	1	2	3	4	5
Hrs Spent Caring for them	6	7	8	8	16

		Ranked	
Pets	Care	Pets	Care
1	6	5	5
2	7	4	4
3	8	3	2.5
4	8	2	2.5
5	16	1	1

→ Lin Reg ($a+bx$) → $r_s = 0.97$

r_s	Correlation
$0 \leq r_s < 0.25$	Very weak
$0.25 \leq r_s < 0.5$	Weak
$0.5 \leq r_s < 0.75$	Moderate
$0.75 \leq r_s < 1$	Strong