Using Recursion in Models and Decision Making MAMDM4a-b

January 8 and 9

What is Recursion?

- Recursion (A.K.A. Iteration): the determination of a succession of elements (as numbers or functions) by operation on one or more preceding elements according to a rule or formula involving a finite number of steps
- Example :
- Given the rule Add 5 then multiply by 2 find the first 6 terms. Note first term =1
- 1,12,,34,78,166,342

Math 1 and 2 Sequence Review

Arithmetic

- Recursive:
- $a_n=a_{n-1}+d$
- Explicit
- $a_n=a_1+d(n-1)$
- or
- $a_n=dn+a_0$

Geometric

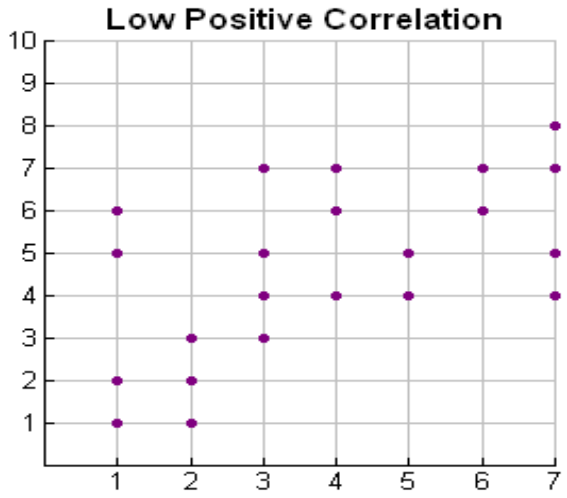
- Recursive:
- $g_n=r\cdot g_{n-1}$
- Explicit
- $g_n=g_1\cdot r^{(n-1)}$

What is a Scatterplot?

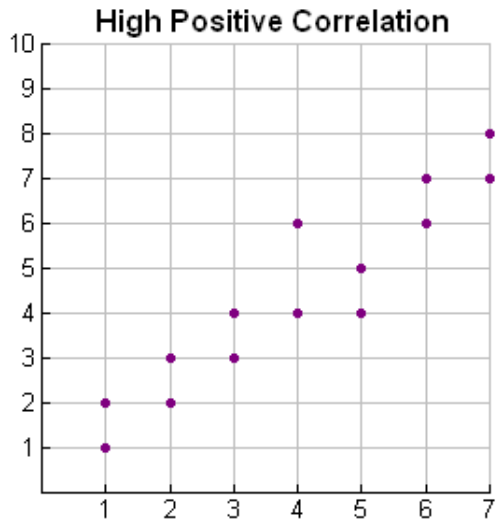
A scatterplot is a graph of *plotted* points that show the relationship between two sets of data.

Scatter plots show association or correlation and strength

- Positive
- As x goes up y goes up
- As x goes down y goes down

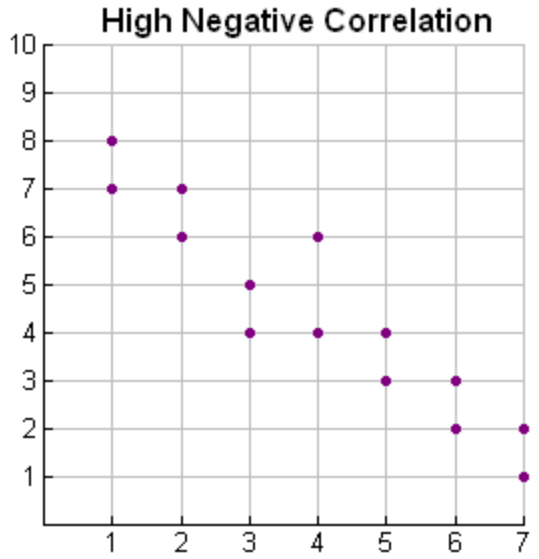


Weak Positive

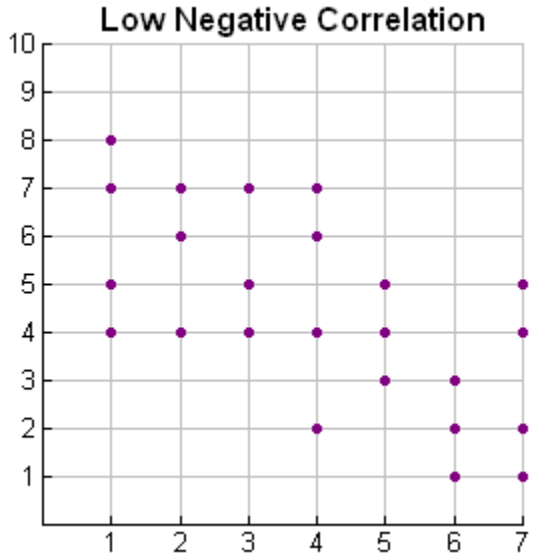


Strong Positive

- Negative
- As x goes up y goes down
- As x goes down y goes up

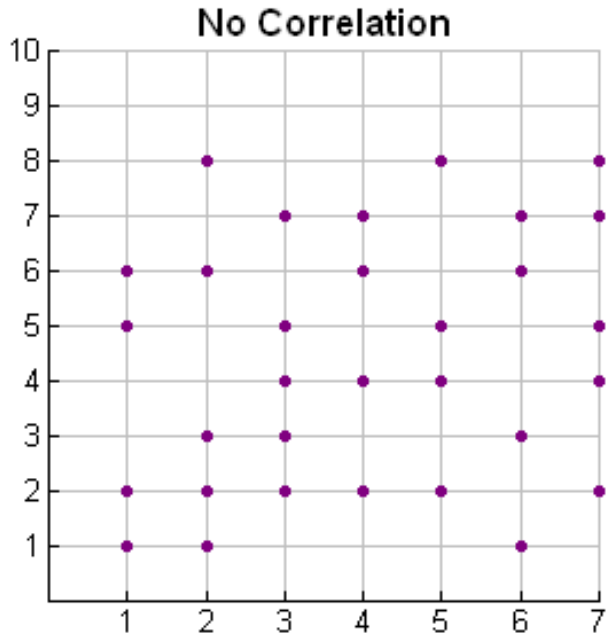


Strong Negative



Weak Negative

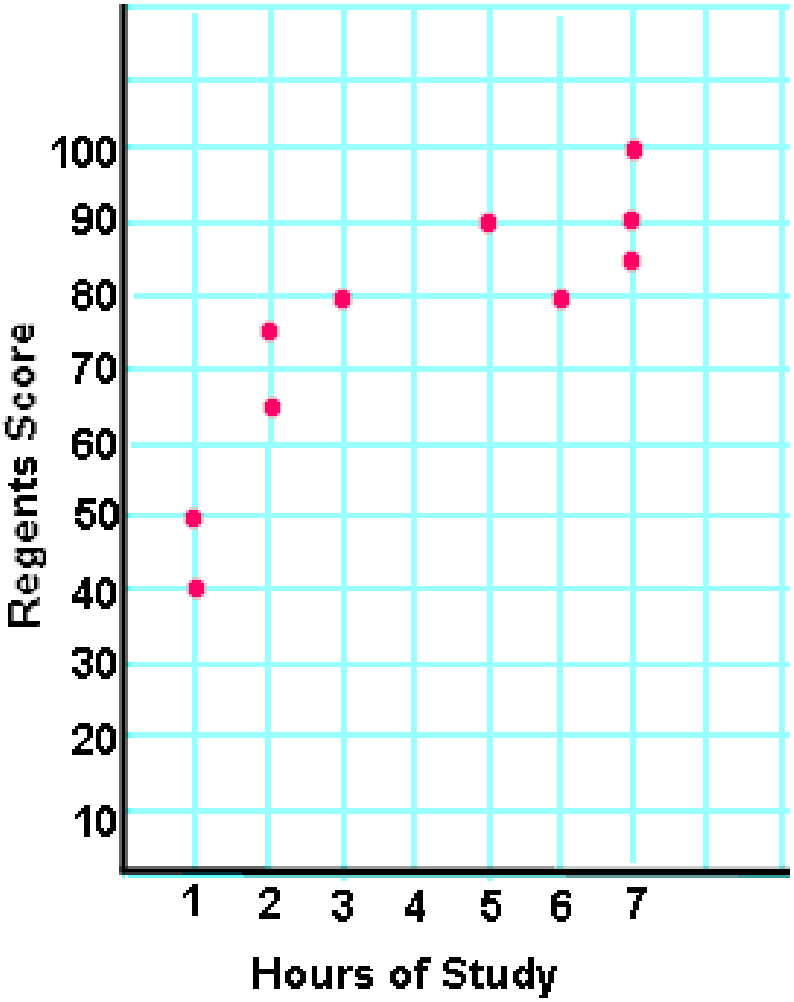
No Correlation



Correlation does not imply causation

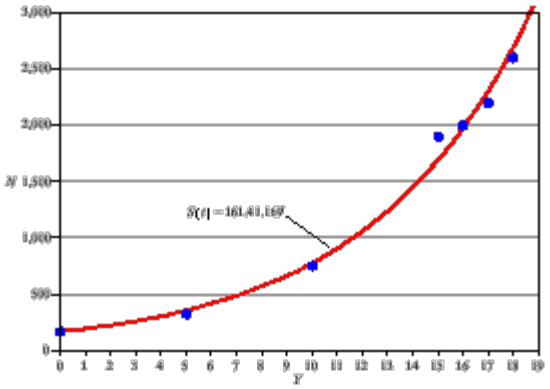
- Correlation: the relationship between two variables
- Causation: the relationship of cause to effect. Is there is a causation then one variable causes the other to occur.
- In an observational study, good evidence of causation requires:
  - a strong association that appears consistently in several studies,
  - a clear explanation for the claimed causal link, and
  - a careful examination of possible lurking variables.
- Just because there is a correlation it does not mean that one variable causes the other to occur. It means there needs to be further study to determine causation.

Most scatterplots you are used to are linear.

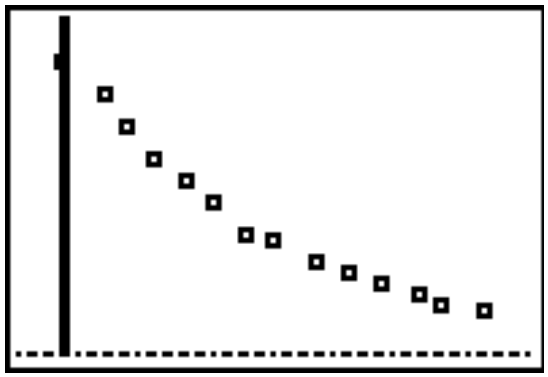


Lets look at some Non linear Scatter plots

- Exponential
  - Growth

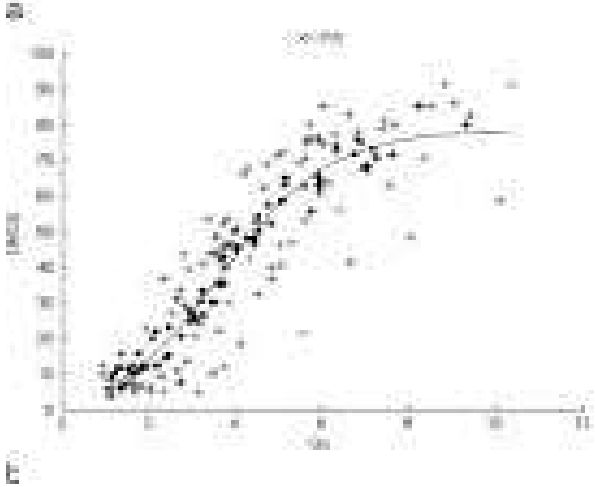


  - Decay

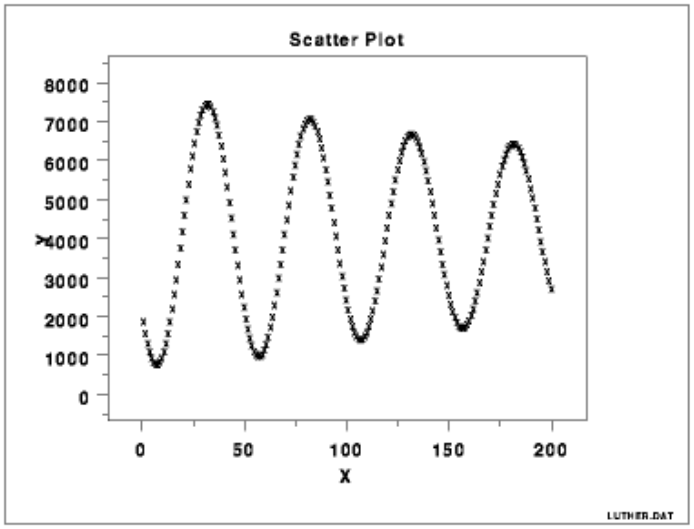


Non linear Scatter plots

- Logistic
- Levels off



- Sinusodal
- Up and down like sea waves



When analyzing bivariate statistics, consider

- Form: Linear or NonLinear Pattern
- Direction: Positive, Negative or no relationship
- Relative Strength: data points tightly clustered together along line or curve (strong) or scattered (weak)