Science Dynamics Masterclass
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8 - Theoretical Probability Models

Binomial Probability Model and Distribution

Binomial Pr...
for discrete variable

independent and identical trials

independent and...
output is dichotomous: head-tail, failure-success etc.

Binomial Equation

Binomial Equa...
probability of obtaining k successes in n trials where p is probability of success and q is probability of failure

$$P(k\ successes\ in\ n\ trials) = \binom{n}{k} p^k q^{n-k}$$

$$\binom{n}{k} = \frac{n!}{k!\,(n-k)!}$$

summary statistics

mean = np

Standard deviation = $\sqrt{npq}$

Binomial Model Criteria

- n identical trials
- trials are independent
- outcomes are mutually exclusive
- p and q do not change values, p+q=1

SPSS

- the probability of exactly k successes
  - the pro...
    pdf.binom(k,n,p)
- the probability of at most k success and probability of at least k successes
  - the probability of at most...
    cdf.binom(k,n,p)
    at most X successes (the same as X or less successes) - k<=X;
    At least X successes - the same as X or more successes k>=X. We calculate cdf.binom(X-1,n,p)=B, then 1-B = answer.

if n increases the binomial gets close to normal

if n increases t...
if both np and nq are greater than or equal to 5m tge approximation to normal is quite good

Normal Probability

Normal Prob...
continuous variables

Normal Distribution is

- $\bar{X}$ symmetric about its mean
- extends indefinitely to the right and to the left
- total area under the curve is 1

Standard Normal Distribution

- mean 0
- standard deviation 1

SPSS

- probability of less or equal to...
- for Standard Normal Distribution
- value that has an area of x to the right...
  - to find z score under standard normal curve of X (percent)
  - what proportion of individuals will score
    - at least X
    - at most X
    - between X and Y
  - X percent of scores on the right, what is the cut off score?
  - percentile rank of X relative to population