

Array Formulas and Z-scores

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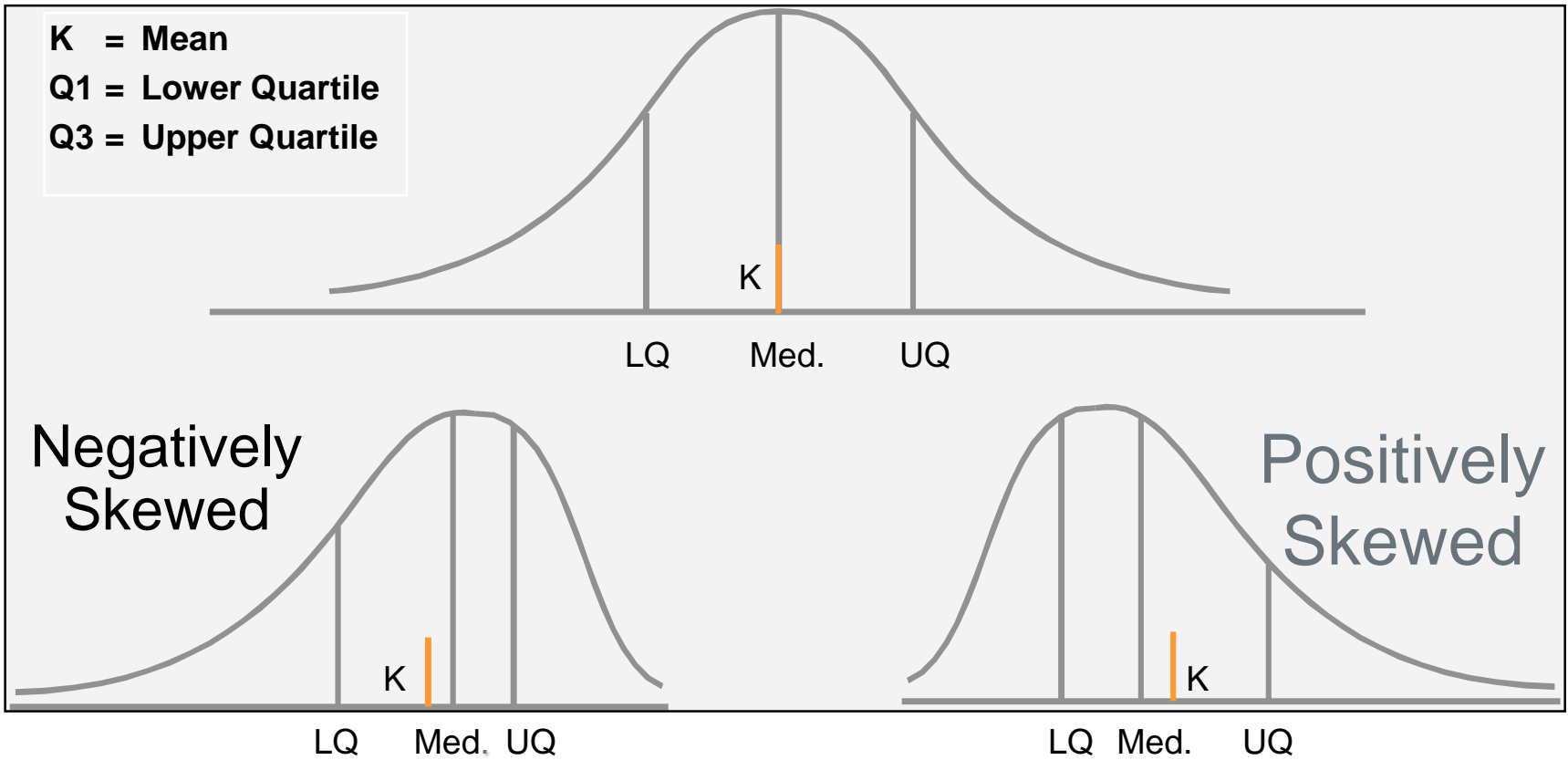
Calculating Medians, Quartiles and Percentiles using Array Formulas

Calculating Medians, Quartiles and Percentiles per Grade or Job

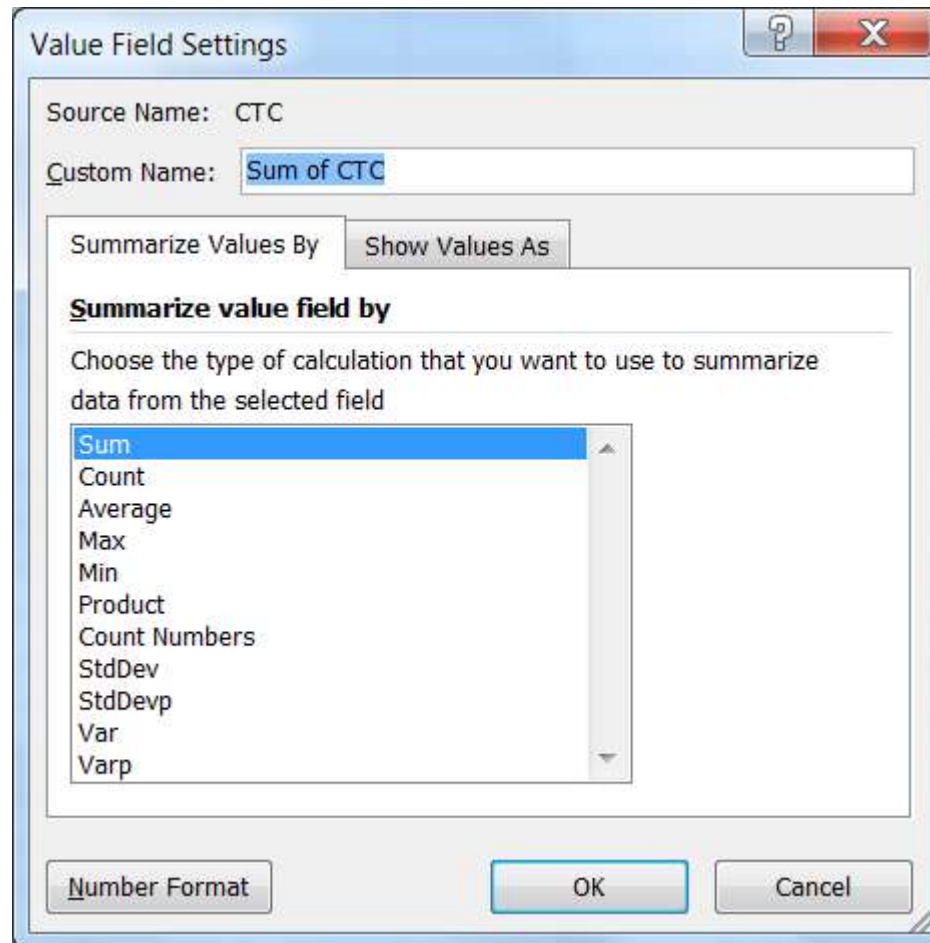


- In reward we often want to calculate measures of location – medians, quartiles and percentiles per grade or per job.
- Salaries are often skewed by high paid employees – this distorts the mean, which makes the median a preferable calculation of the average

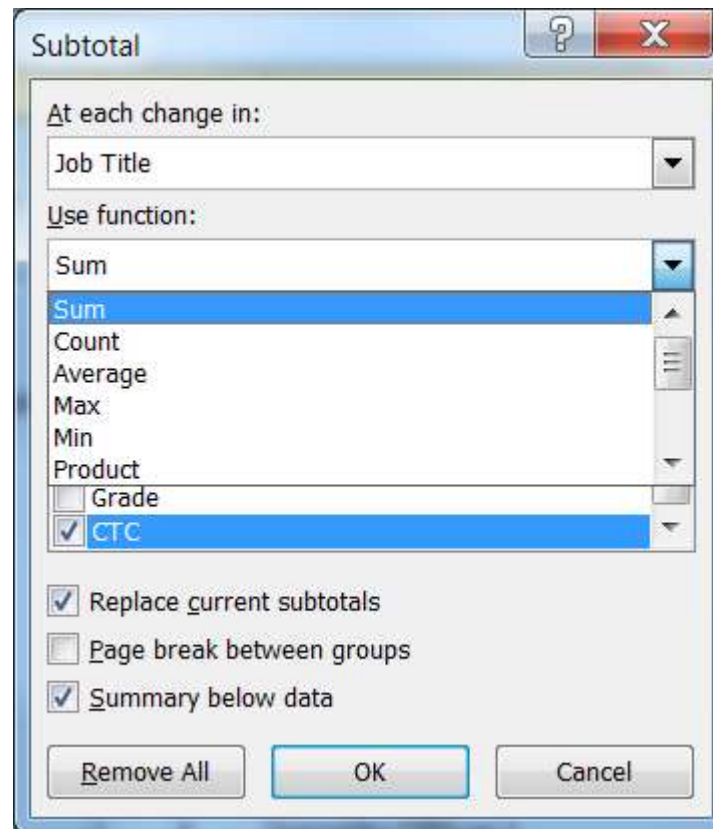
Distribution Curves



In Excel you cannot calculate these statistics using pivot tables



Neither can you calculate these statistics using Subtotals



Can calculate them using Array Formulas



- Array formulas allow you to perform calculations on whole arrays of data at one time
- Multi-cell or single-cell array formulas
- You have to press Control, Shift, Enter when entering or editing them. Excel puts in braces { }
- They allow you to do calculations that cannot be done using standard Excel formulas, such as calculating medians, quartiles or percentiles per grade or job



Let's go to Excel



Using pivot tables to calculate averages and standard deviations per job.

Using Vlookup and other formulas to calculate z-scores per employee to test for excessive pay variance within jobs

Equal pay for work of equal value



- Amendments to the Employment Equity Act, effective 1 Aug 2014 to introduce the concept of equal pay for work of equal value
- Organisations may not discriminate in terms of pay and conditions of employment between employees who perform work of equal value based on race, sex, gender, disability or other listed grounds or any other arbitrary grounds
- Jobs should be measured using responsibility, skills, effort, and may include working conditions as a measure

Not unfair discrimination if difference is fair and rational and based on any one or a combination of the following grounds:



- Seniority or length of service
- Qualifications, ability, competence or potential
- Performance, quantity or quality of work
- Demotion without salary reduction
- Temporarily in a position
- Skills shortage
- Any other relevant factor that is not unfairly discriminatory

Process for doing audit

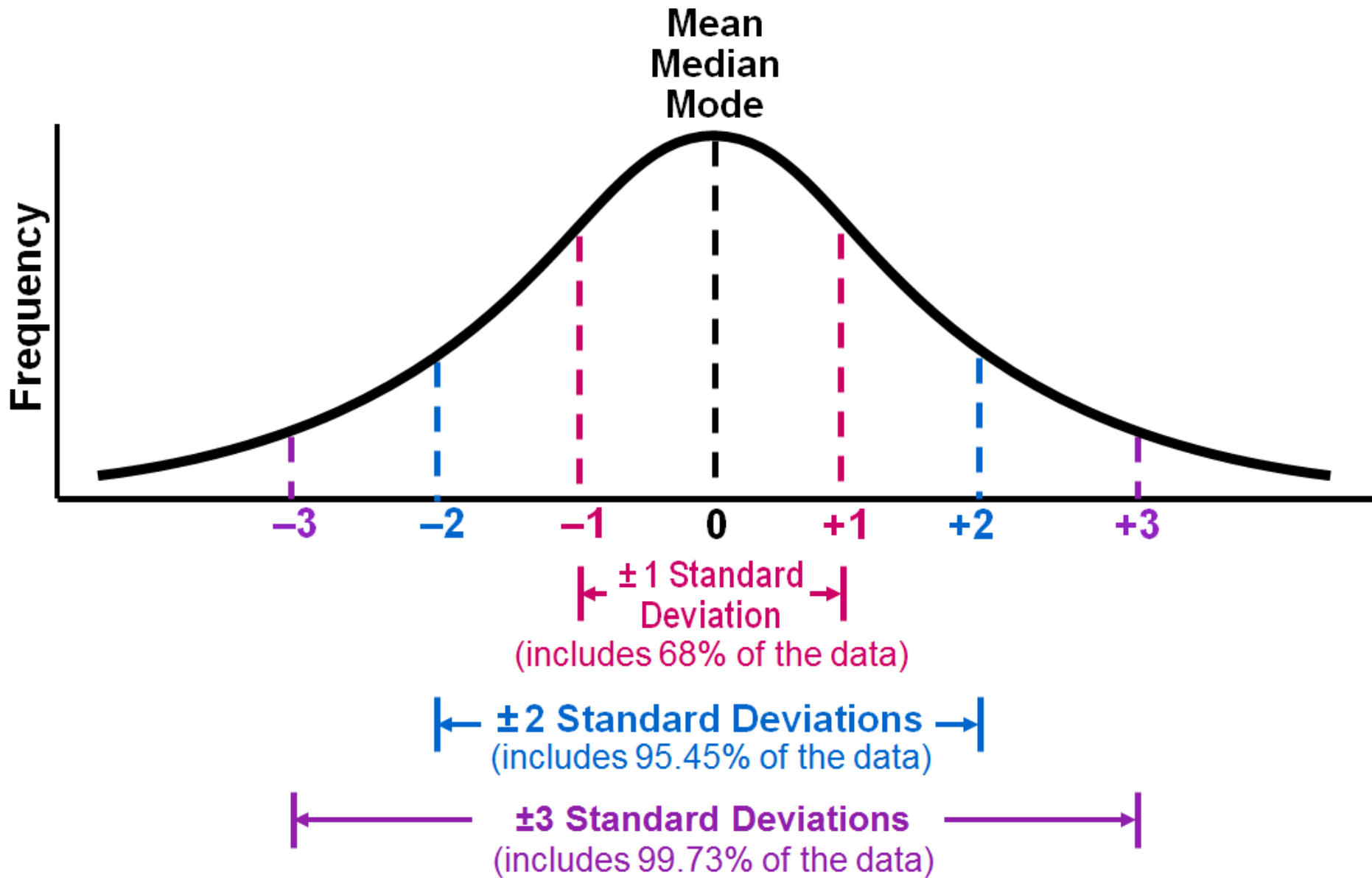


- Utilise a job evaluation system that is fair and transparent and does not have the effect of discriminating unfairly on any listed or arbitrary ground.
- Select a method of comparing remuneration, both in money and kind, in the relevant jobs: this can be done by using either the average or the median earning of employees in the relevant jobs as the basis for remuneration comparisons or by using another method that will compare remuneration in a fair and rational manner.
- Where differentiation is found not to be justifiable, determine how to address inequalities identified, without reducing the remuneration of employees to bring about equal remuneration.

Suggest – use 2 sigma test



- Internationally accepted norm for variance in pay. If someone's pay is more than 2 standard deviations from the mean, it is regarded as an outlier and you need to investigate reasons for variance
- Widely used in the US to test for pay discrimination



Suggest – use 2 sigma test



- Measure standard deviations from the mean using z-scores or standard scores
- $Z\text{-score} = (\text{Pay} - \text{Mean}) / \text{Standard Deviation}$
- Looking for z-scores of >2 or <-2

- Could also use pay scales as a test of reasonableness, but need to be cautious if using broad bands as then pay scales may be very wide



Let's go to Excel