

## How People Learn

### Week 12 Solutions

1. Likert data is ordinal in nature. It should be presented with a bar chart (this is non continuous, unlike a histogram, and has clearly defined endpoints unlike a pie chart).
2. Faculty of origin is nominal data. This means we are presenting two types of categorical data. A stacked bar chart would be appropriate.
3. Chi-square. Data categorical by categorical and can be presented in a contingency table. Hence chi square is appropriate.
4. Chi-square is problematic if the expected value in a cell is less than five. This may be the case given the scenario described. To address this problem, the 'agree' and 'strongly agree'.
5. Scatterplot. Continuous by continuous data.
6. Correlation ('r'). It would not be good to use correlation if the relationship does not look linear. (Homoscedasticity – that the variance is more or less the same across the range of x values (i.e. the distribution looks like a tube and not a cone) – is also an assumption but we didn't really address that in exercises).
7. Box plot. Two histograms side by side could also be used, but boxplot is a bit neater when showing relationships between continuous and categorical data.
8. The number in both samples is not more than 25, so a t-test is probably best. This is reasonable if the data appears more or less normal. If the variance is similar (the ratio of one to the other is less than 3:1) then pooled variance should be used. So, a two sample t-test with pooled variance should be used.
9. One sample z-test. (Software will often refer to this as a one sample t-test since the t-distribution is identical to the z distribution with larger samples which means there is no difference in practice between t- and z- test for larger samples).
10. If there is more than 3 items in the scale then a cut off of 0.7 can be used to identify if the scale is reliable. In this case the same appears reliable. This tells you nothing about validity.
11. Since it is the same person on both occasions a paired t-test should be used. Since you are looking to see if there is an increase and not just a difference (i.e. since the hypothesis has a direction) a one-tailed test would be used.