# SB & SC - Poisson distribution & Type I/II errors

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| **How can 2 Poisson Distributions be combined?** | *This leads to result that m x X = Po(m x λ) where m is a positive rational number.* |
| **What 4 conditions are needed for something to follow a Poisson distribution?** | * Events occur at a constant average rate. * Events occur randomly and independently. * There can only be a discrete number of events. * Events occur singly.   *Events occurring singly means that the probability of two events occurring in the same narrow interval is negligible.*  *Furthermore, independent and random would mean no queues present (eg, cars on a motorway must be able to overtake freely and calls to a switch board must be dealt with instantly / no queuing).* |
| **What is equal to the mean under Poisson?** | Mean (λ) = median = mode = variance.  *λ is average rate of occurrence in a given interval (eg, average number of events an hour).* |
| **What is H0 and H1?** | * H0 - null hypothesis. * H1 - alternative hypothesis (what you’re testing for). |
| **What is the p-value?** | The probability of getting ≥ or ≤ a value given the null hypothesis is true (in other words, the probability of the data is at least as extreme as observed). |
| **What does the central limit theorem state?** | The distribution of your sample means tends to the normal distribution (yet with a lower standard deviation than the population) as the sample size increases. |
| **How is the evidence against H0 measured?** | * By using the p-value. * The smaller it is, the greater the evidence UNTIL it’s smaller than the significance value at which you reject H0.   *The greater the sample size, the more power the p-value has.* |
| **What a Type I and Type II error?** | * Type I - rejecting H0 when in fact it is true (false positive) * Type II - failing to reject H0 when it is in fact false (false negative)  |  |  |  | | --- | --- | --- | | **Outcomes** | **Underlying truth** | | | **H0 false** | **H0 true** | | **Reject H0** | Correct | Type I error | | **Don’t reject H0** | Type II error | Correct | |
| **What is P(Type I Error) equal to in the case of continuous and the case of discrete?** | * Continuous - α (the significance value). * Discrete - the probability of something occur just below the significance value.   *Reducing the value does increase the chances of a Type II error so you need a balance.* |
| **What is the power of a test?** | 1 - P(Type II Error).  *This is, obviously, the probability of not making a Type II error.* |
| **How can you find the P(Type II Error)?** | 1. Find the critical values. 2. Find the probability of accepting H0 (lying in the critical values) under the actual mean. |