ASQ CRE Prep course

Lesson II. A. 4. e.

Poisson Process Models

Laplace's Trend Test

Another trend test

LAPLACE'S TREND TEST

Step 1: Set Period of Observation

- **Set T the period of interest**

- **Either at time of last failure**
  - **Drop last failure and**
  - **Reduce n by one**
- **Or, a duration of interest, say one year**

Step 2: Gather arrival times

- **Test uses cumulative times, not interarrival times**

- **Let's use the example of:**

  36, 63, 86, 128, 165, 324

  are days on which repairs occur and repairs take about an hour

Step 3: Calculate test statistic

- **The test statistic z is** $z = \left(\frac{2\bar{t}}{T} - 1 \right) \sqrt{3n}$
  - **T is selected duration**
  - **t-bar is the mean of cumulative time to failure data** $\bar{t} = \frac{\sum t_i}{n} = \frac{802}{6} = 133.67$
- **Let's set T = 365 days, and**
- **Thus** $z = \left(\frac{2\bar{t}}{T} - 1 \right) \sqrt{3n} = \left(\frac{2(133.67)}{365} - 1 \right) \sqrt{3(6)} = -1.135$

Step 5: Compare z-value & critical value

- **The critical value for α =0.05 for this two sided test is ±1.96**
- **Since -1.13 is within the range of ±1.96 the data does not show convincing evidence of a trend**
- **Extreme negative values show improving reliability, extreme positive values show degradation**

Why would you want to know the trend?

ASQ CRE Prep course

Lesson II. A. 4. f.

Poisson Process Models

Fisher's Composite Test