"Reliability"   Mr. Danziger   Oct 10/57

Binomial Distribution:

$$P(r) = (q+p)^n \leftarrow \text{Sample size}$$

% good   % defectives

$$P(r) = \frac{\quad}{(n-r)!\,n!}$$

Poisson Failure Law: for large sample or very low % defectives

$$P(r) = \frac{(t/\bar{x})^r}{r!}\, e^{-t/\bar{x}}$$

Prob. of obtaining r failures in time t, $\bar{x}$ = mean time between failures

Exponential Failure Law:

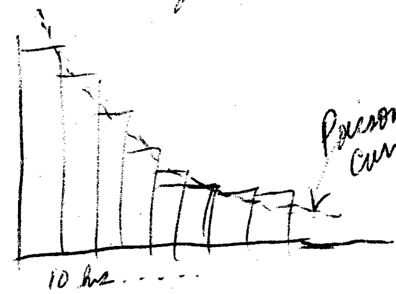
$$P(0) = e^{-t/\bar{x}}$$ = prob. of going without failure

from above $\frac{(t/\bar{x})^0}{0!} = 1$

P. of 0 or 1 errors $= P(0)+P(1) = e^{-t/\bar{x}}\left[1+\frac{t}{\bar{x}}\right]$

applied to service call data. – get mean time between calls, ~~also~~ max, min's,

702 Prudential Life,



shortest time between calls is the most common.

(calls occurring at random in time)

Mean Time = 16 hrs.   fail prob. $= 0.37 \;\left(\frac{1}{e}\right)$ of going 16 hrs.

50% is 12 hrs.

contrary to intuitive feeling of 50-50 errors about the ave.

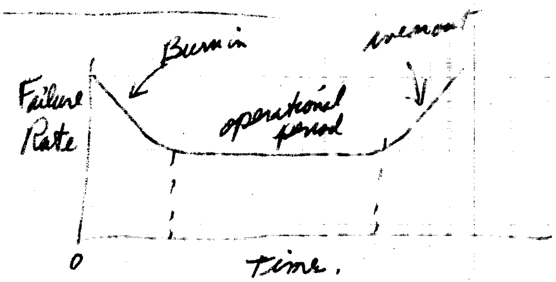
Specifying "X no. of operations between errors" does not mean half are less than X & half more.

If one says we want to go 8 hours at least 90% of time Then $\overline{X}$ = 80 hrs.

Example: Magnetic tape

Consider as a zipper.

Three basic Periods →



constant failure rate in op. time.

get same exponential curve.

Mean: 87 passes.

Probability of survival