

Package ‘rSSP’

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Type Package

Title Single Acceptance Sampling Plans for Time-Truncated Life Test

Version 0.1.0

Description Designing single acceptance sampling inspection plans under time-truncated life tests and calculates the minimum required sample size subject to a consumer's risk constraint on the probability of acceptance. Failure probabilities can be supplied from any lifetime distribution, allowing the methodology to be applied without restricting the analysis to a particular probability model. The package also provides plot of the required sample size against the termination ratio. Tripathi et al. (2023) <[doi:10.1007/s41872-023-00221-x](https://doi.org/10.1007/s41872-023-00221-x)>; Hu and Gui (2018) <[doi:10.1080/09720510.2017.1413044](https://doi.org/10.1080/09720510.2017.1413044)>.

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plot_single_asip

Plot Sample Size Against Termination Ratio

Description

Calculates the minimum sample size for different termination ratios and plots the resulting sample size against the termination ratio.

Usage

```
plot_single_asip(p, a, b = 1, be = 0.25, c = 0, ylim = c(0, 50))
```

Arguments

p	User-defined probability of failure corresponding to each termination ratio.
a	Numeric vector of termination ratios.
b	Quality ratio. It may be a single value or a vector having the same length as a.
be	Producer's risk.
c	Acceptance number.
ylim	Numeric vector of length two specifying the limits of the y-axis. Default is c(0, 50).

Details

The user supplies the corresponding values of p calculated from their own lifetime distribution.

Value

A data frame containing a, b, p and the required sample size n.

Examples

```
# Example 1: User-defined failure probabilities
p <- c(0.05, 0.10, 0.15, 0.20)

plot_single_asip(
  p = p,
  a = c(0.5, 1, 1.5, 2),
  b = 1,
  be = 0.25,
  c = 0,
  ylim=c(0,50)
)

# Example 2: Failure probabilities obtained from
# a Burr Type X lifetime distribution
```

```

a1 <- 0.5
b <- 1
a <- c(0.4, 0.6, 0.8, 1, 1.5, 2, 2.5, 3)

h <- sqrt(
  -log(
    1 - (1/2)^(1/a1)
  )
)

p <- (1 - exp(-(a * h / b)^2))^a1

plot_single_asip(
  p = p,
  a = a,
  b = b,
  be = 0.25,
  c = 6,
  ylim = c(0, 50)
)

```

single_asip

Single Acceptance Sampling Inspection Plan

Description

Calculates the minimum required sample size for a single acceptance sampling inspection plan under a time-truncated life test using the producer's risk condition $P_a \leq be$.

Usage

```
single_asip(p, a, b, be = 0.25, c = 0)
```

Arguments

p	User-defined probability of failure before the termination time. It must lie between 0 and 1.
a	Termination ratio, defined as $a = t/\theta_0$. It must be a positive numeric value.
b	Quality ratio, defined as $b = \theta/\theta_0$. It must be a positive numeric value.
be	Producer's risk. It must be a value between 0 and 1.
c	Acceptance number. It must be a non-negative integer.

Details

The probability p is user-defined. Therefore, no particular lifetime distribution is embedded in this function.

Value

A data frame containing a, b, p, be, c, required sample size n, and probability of acceptance Pa.

Examples

```
# Example 1: User-defined failure probabilities
p <- c(0.05, 0.10, 0.15, 0.20)

single_asip(
  p = p,
  a = c(0.5, 1, 1.5, 2),
  b = 1,
  be = 0.25,
  c = 0
)

# Example 2: Failure probabilities obtained from
# a Burr Type X lifetime distribution

a1 <- 0.5
b <- 1
a <- c(0.4, 0.6, 0.8, 1, 1.5, 2, 2.5, 3)

h <- sqrt(
  -log(
    1 - (1/2)^(1/a1)
  )
)

p <- (1 - exp(-(a * h / b)^2))^a1

single_asip(
  p = p,
  a = a,
  b = b,
  be = 0.25,
  c = 6
)
```

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