

# Package ‘PEGroupTesting’

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**Type** Package

**Title** Population Proportion Estimation using Group Testing

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**Depends** R (>= 3.1.0)

**Imports** stats

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**Description** The population proportion using group testing can be estimated by different methods. Four functions including `p.mle()`, `p.gart()`, `p.burrow()` and `p.order()` are provided to implement four estimating methods including the maximum likelihood estimate, Gart's estimate, Burrow's estimate, and order statistic estimate.

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 PEGroupTesting-package

*Population Proportion Estimation using Group Testing*


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### Description

The population proportion using group testing can be estimated by different methods. Four functions including `p.mle()`, `p.gart()`, `p.burrow()` and `p.order()` are provided to implement four estimating methods including the maximum likelihood estimate, Gart's estimate, Burrow's estimate, and order statistic estimate.

### Author(s)

Qingyang Zhang, Yanchuan Li

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### References

Ayung, J. (2003) Tutorial on maximum likelihood estimation. *Journal of Mathematical Psychology*. 47(1). <<http://www.sciencedirect.com/science/article/pii/S0022249602000287>>

Ding, J. and Xiong, W. (2016) A new estimator for a population proportion using group testing. *Communication in Statistics-Simulation and Computation*. 45(101-114) <<http://dx.doi.org/10.1080/03610918.2013.854909>>

Gart, J. (1991) An application of score methodology: confidence intervals and tests of fit for one-hit curves. *Handbook of Statistics*, 8(395-406), Amsterdam Elsevier. <<https://www.elsevier.com/books/book-series/handbook-of-statistics>>

Burrows, P. (1987) Improved estimation of pathogen transmission rates by group testing. *Phytopathology*. 77(363-365) <<https://www.apsnet.org/publications/phytopathology/backissues/Documents/1987Articles>>

### Examples

```
library(PEGroupTesting)
mydata=matrix(c(50,10,45),nrow=1,ncol=3,byrow=TRUE)
p.mle(mydata)
p.burrow(mydata)
p.gart(mydata)
p.order(mydata)
```

---

 p.burrow

*Burrow's estimate for population proportion using group testing*


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### Description

This function estimates population proportion by group testing using Burrow's method. It is for equal group size only.

**Usage**

```
p.burrow(obs)
```

**Arguments**

obs                    A 1 by 3 matrix containing the data information. Column 1 is the number of groups. Column 2 is group size. Column 3 is number of positives.

**Value**

Burrow's estimate for population proportion by group testing.

**Author(s)**

Qingyang Zhang, Yanchuan Li

**References**

Burrows, P. (1987) Improved estimation of pathogen transmission rates by group testing. *Phytopathology*. 77(363-365) <<https://www.apsnet.org/publications/phytopathology/backissues/Documents/1987Articles>>

**Examples**

```
library(PEGroupTesting)
mydata=matrix(c(50,10,45),nrow=1,byrow=TRUE)
p.burrow(mydata)
```

---

*p.gart*

*Gart's estimate for population proportion by group testing*

---

**Description**

The function estimates the population proportion by group testing using Gart's method. It is for both equal and unequal group size.

**Usage**

```
p.gart(obs)
```

**Arguments**

obs                    A three-column matrix containing all the data information. Column 1 is the number of groups. Column 2 is group size. Column 3 is number of positives. Different rows corresponds to different group sizes.

**Value**

Gart's estimate for population proportion by group testing

**Author(s)**

Qingyang Zhang, Yanchuan Li

**References**

Gary, J. (1991) An application of score methodology: confidence intervals and tests of fit for one-hit curves. *Handbook of Statistics*, 8(395-406), Amsterdam Elsevier. <<https://www.elsevier.com/books/book-series/handbook-of-statistics>>

**Examples**

```
library(PEGroupTesting)
mydata=matrix(c(50,10,40,40,8,37),nrow=2,byrow=TRUE)
p.gart(mydata)
```

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p.mle	<i>Maximum likelihood estimate for population proportion by group testing</i>
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**Description**

This function estimates the population proportion by group testing using maximum likelihood method. It is for both equal and unequal group size.

**Usage**

```
p.mle(obs)
```

**Arguments**

obs	A three-column matrix containing all the data information. Column 1 is the number of groups. Column 2 is group size. Column 3 is number of positives. Different rows corresponds to different group sizes.
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**Value**

The maximum likelihood estimate for population proportion by group testing

**Author(s)**

Qingyang Zhang, Yanchuan Li

**References**

Ayung, J. (2003) Tutorial on maximum likelihood estimation. *Journal of Mathematical Psychology*. 47(1). <<http://www.sciencedirect.com/science/article/pii/S0022249602000287>>

**Examples**

```
library(PEGroupTesting)
mydata=matrix(c(50,10,40,40,8,37),nrow=2,byrow=TRUE)
p.mle(mydata)
```

---

p.order

*Order statistics estimate for population proportion using group testing*

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**Description**

This function estimates the population proportion using order statistics method (Ding and Xiong 2016). It is for equal group size only.

**Usage**

```
p.order(obs)
```

**Arguments**

obs                    A 1 by 3 matrix containing the data information. Column 1 is the number of groups. Column 2 is group size. Column 3 is number of positives.

**Value**

Order statistics estimate for population proportion in group testing

**Author(s)**

Qingyang Zhang, Yanchuan Li

**References**

Ding, J. and Xiong, W. (2016) A new estimator for a population proportion using group testing. Communication in Statistics-Simulation and Computation. 45(101-114) <<http://dx.doi.org/10.1080/03610918.2013.854909>>

**Examples**

```
library(PEGroupTesting)
mydata=matrix(c(50,10,45),nrow=1,byrow=TRUE)
p.order(mydata)
```

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