# Package: PEGroupTesting (via r-universe)

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**Type** Package

**Title** Population Proportion Estimation using Group Testing

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**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*

## 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

Maintainer: Qingyang Zhang <qz008@uark.edu>

## 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*

## 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)
```

---

# p.mle *Maximum likelihood estimate for population proportion by group testing*

---

## 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. |

## 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*

---

## 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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