Introduction to R Software

Introduction to Statistical Functions
:::
Graphics and Plots

Shalabh

Department of Mathematics and Statistics

Indian Institute of Technology Kanpur

Graphical tools:

Graphical tools- various type of plots

- 2D & 3D plots,

- scatter diagram

- Pie diagram

- Histogram

- Bar plot

- Stem and leaf plot

- Box plot ...

Appropriate number and choice of plots in analysis provides better inferences.

Graphical tools:

In R, Such graphics can be easily created and saved in various formats.

- o **Bar plot**

- o **Pie chart**

- o **Box plot**

- o **Grouped box plot**

- o **Scatter plot**

- o **Coplots**

- o **Histogram**

- o **Normal QQ plot ...**

Bar plots:

Visualize the relative or absolute frequencies of observed values of a variable.

It consists of one bar for each category.

The height of each bar is determined by either the absolute frequency or the relative frequency of the respective category and is shown on the *y-axis.*

```
barplot(x, width = 1, space = NULL,…)

> barplot(table(x))

> barplot(table(x)/length(x))
```

Bar plots:

```
> help("barplot")

barplot(height, width = 1, space = NULL,
names.arg = NULL, legend.text = NULL, beside
= FALSE, horiz = FALSE, density = NULL, angle
= 45, col = NULL, border = par("fg"), main =
NULL, sub = NULL, xlab = NULL, ylab = NULL,
xlim = NULL, ylim = NULL, xpd = TRUE, log =
"", axes = TRUE, axisnames = TRUE, cex.axis =
par("cex.axis"), cex.names = par("cex.axis"),
inside = TRUE, plot = TRUE, axis.lty = 0,
offset = 0, add = FALSE, args.legend = NULL,
...)
```

Example:

Code the 10 persons by using, say 1 for male (M) and 2 for female (F).

M, F, M, F, M, M, M, F, M, M

1, 2, 1, 2, 1, 1, 1, 2, 1, 1

```
> gender <- c(1, 2, 1, 2, 1, 1, 1, 2, 1, 1)

> gender
 [1] 1 2 1 2 1 1 1 2 1 1
```
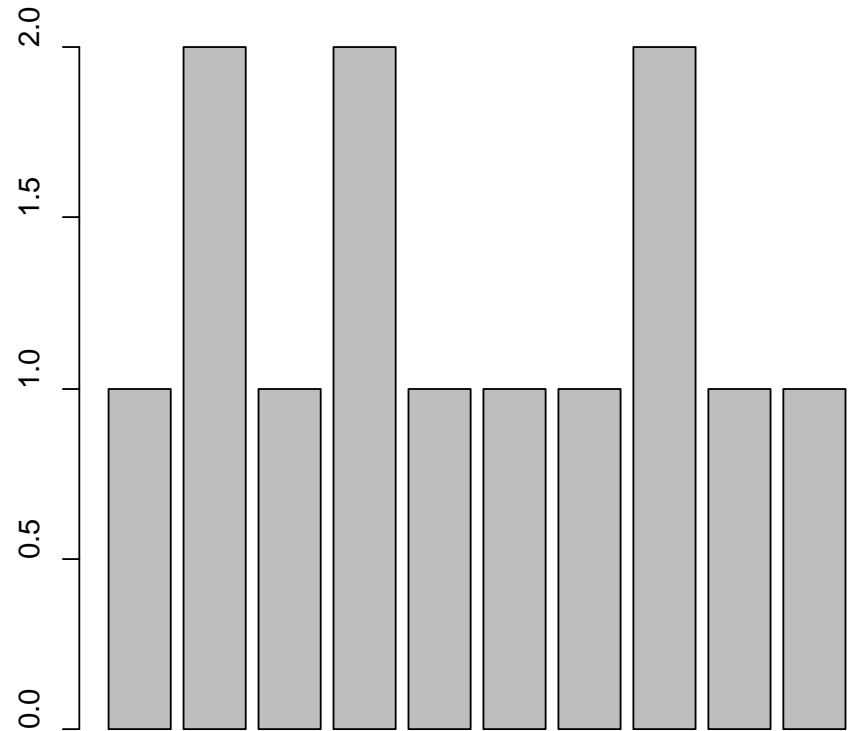
R Console
```
> gender <- c(1, 2, 1, 2, 1, 1, 1, 2, 1, 1)
> gender
 [1] 1 2 1 2 1 1 1 2 1 1
```

Bar plots: Example

```
> barplot(gender)
```
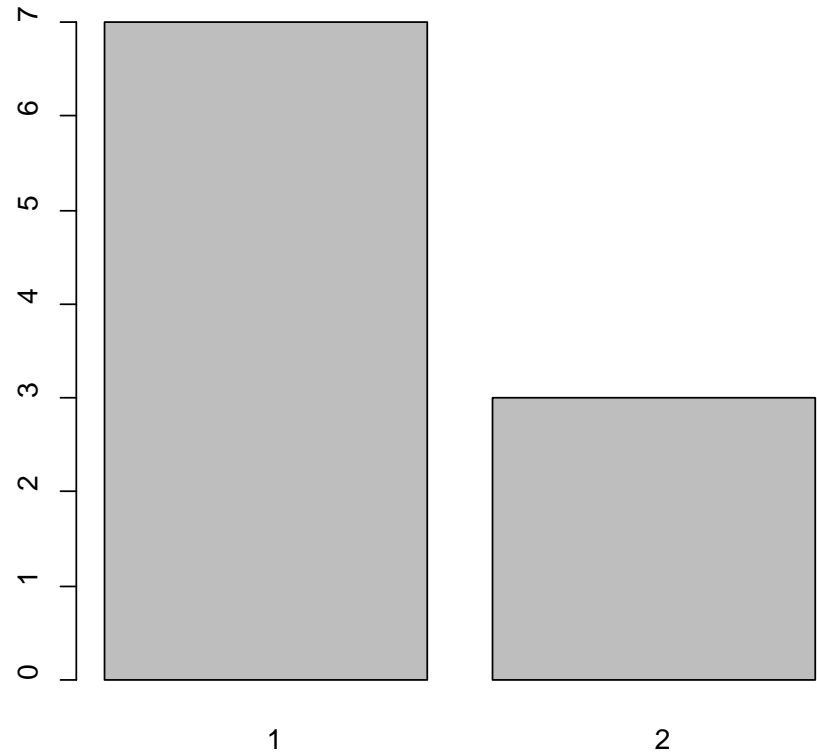
Do you want this?

Bar plots:
Example

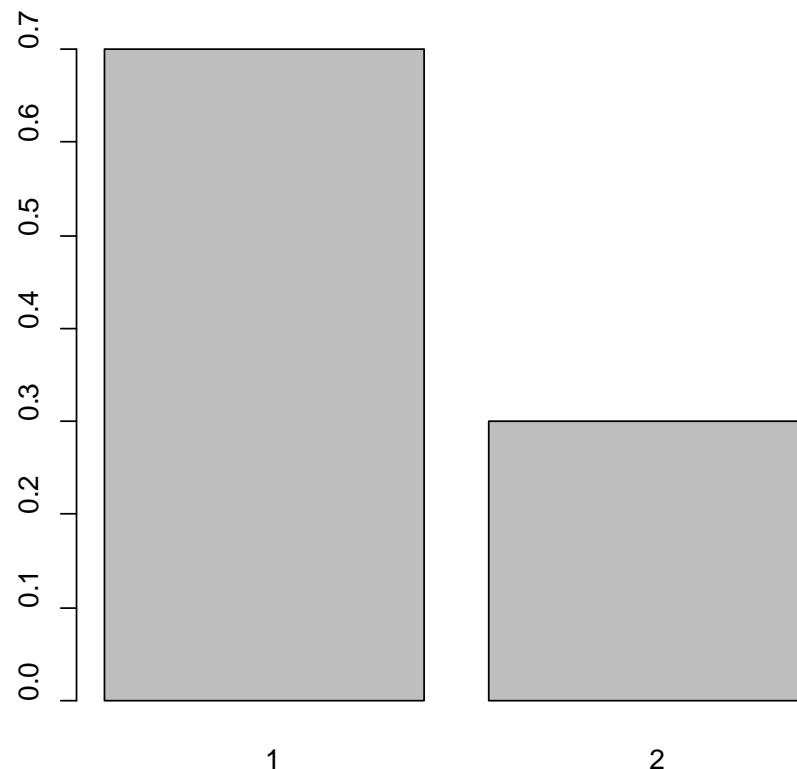```
> table(gender)
gender
1 2
7 3

> barplot(table(gender))
```

# Bar plots:
## Example

```
> table(gender)/length(gender)
gender
  1   2
0.7 0.3
```



```
> barplot(table(gender)/length(gender))
```

Example

'pizza_delivery.csv' **contains the simulated data on pizza home delivery.**

- **There are three branches (East, West, Central) of the restaurant.**
- **The pizza delivery is centrally managed over phone and delivered by one of the five drivers.**
- **The data set captures the number of pizzas ordered and the final bill**

```
> setwd("C:/Rcourse")
> pizza <- read.csv('pizza_delivery.csv')
```

Example

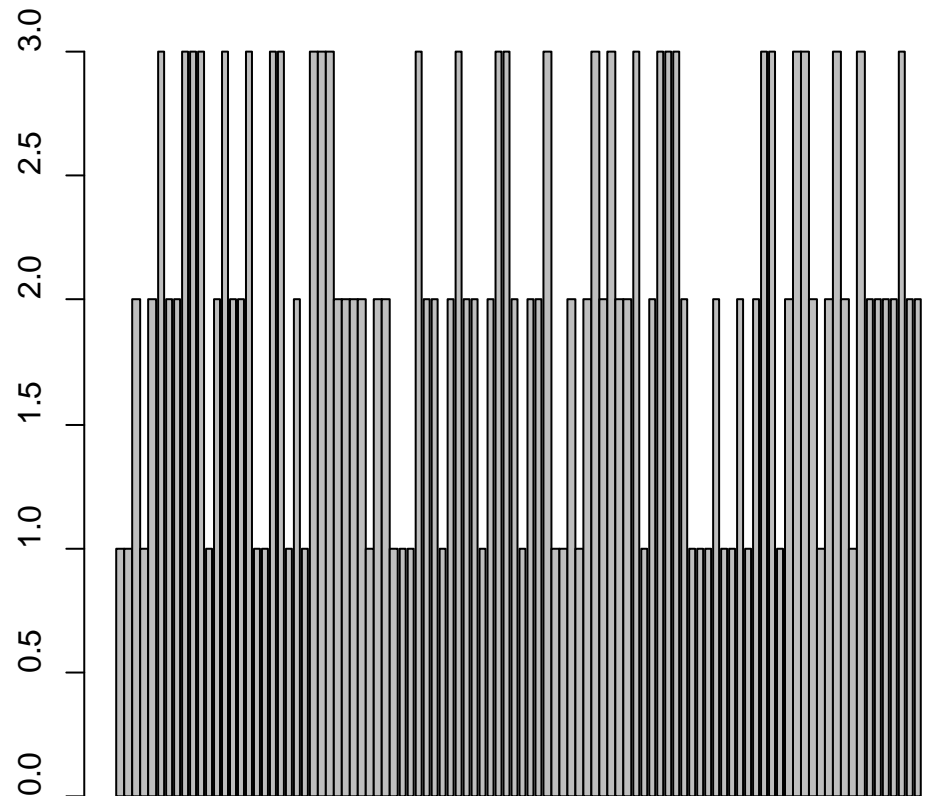**Consider data from Pizza. Take first 100 values from Direction and code Directions as**

❖ **East: 1**
❖ **West: 2**
❖ **Centre: 3**

```
direction <-c(1,1,2,1,2,3,2,2,3,3,3,1,2,3,2,2,3,1,
1,3,3,1,2,1,3,3,3,2,2,2,2,1,2,2,1,1,1,3,2,2,1,2,3,2
,2,1,2,3,3,2,1,2,2,3,1,1,2,1,2,3,2,3,2,2,3,1,2,3,3,
3,2,1,1,1,2,1,1,2,1,2,3,3,1,2,3,3,2,1,2,3,2,1,3,2,2
,2,2,3,2,2)
```
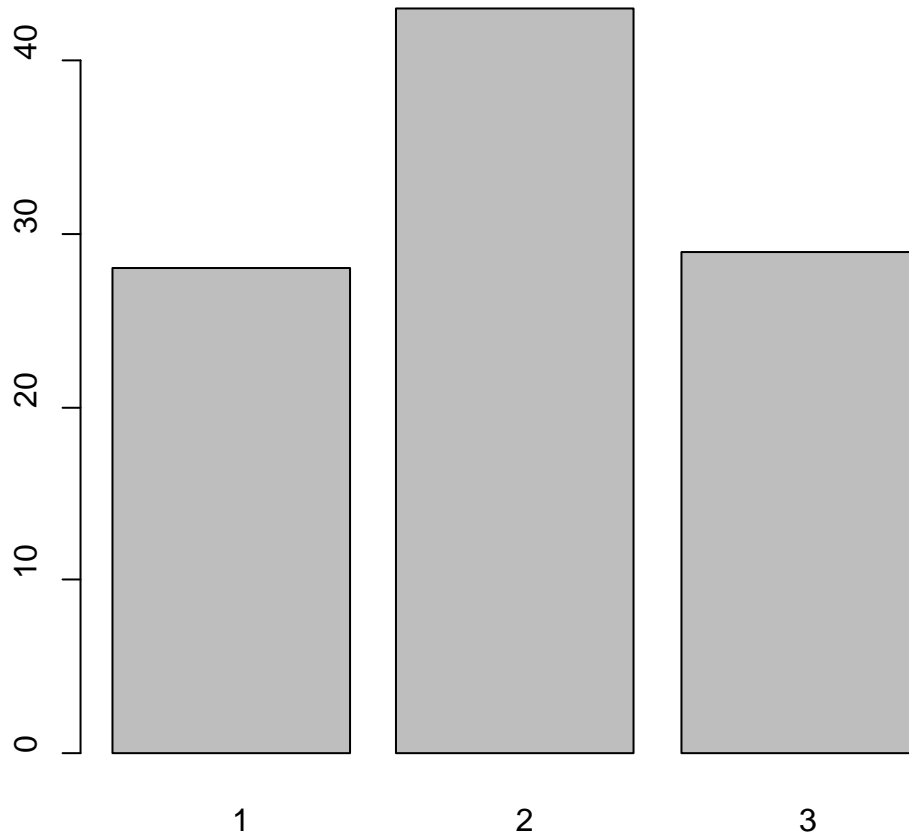
Bar plots:
Example

```
> barplot(direction)
```
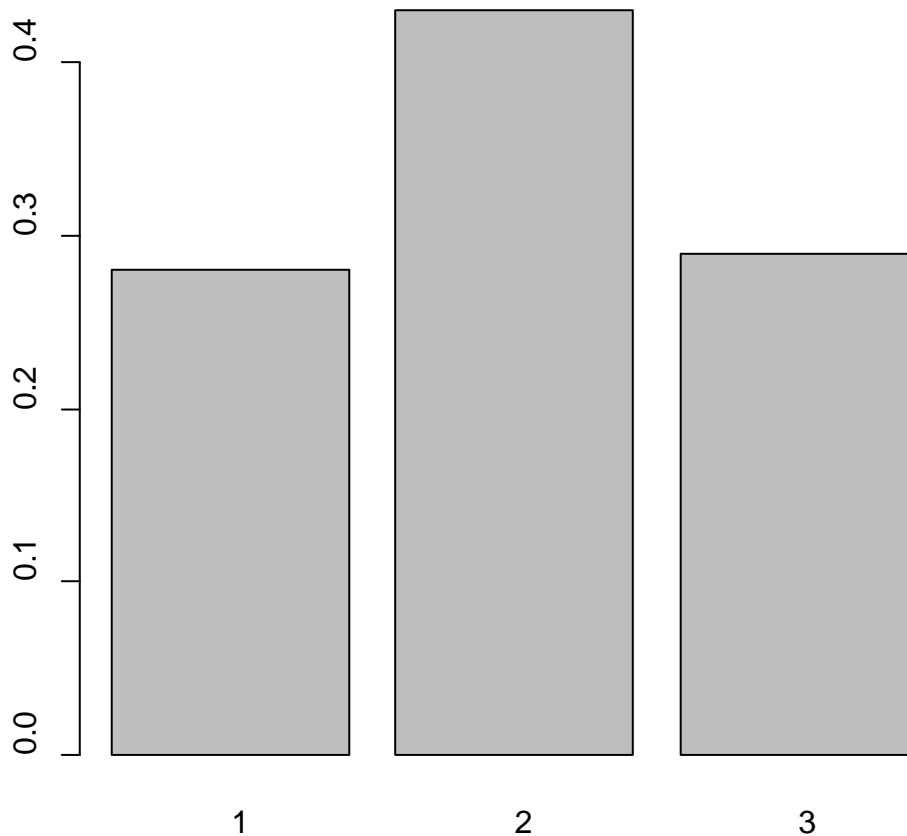
Do you want this?

Bar plots:
Example

```
> barplot(table(direction))
```

Bar plots:
Example

```
> barplot(table(direction)/length(direction))
```

Pie diagram:

Pie charts visualize the absolute and relative frequencies.

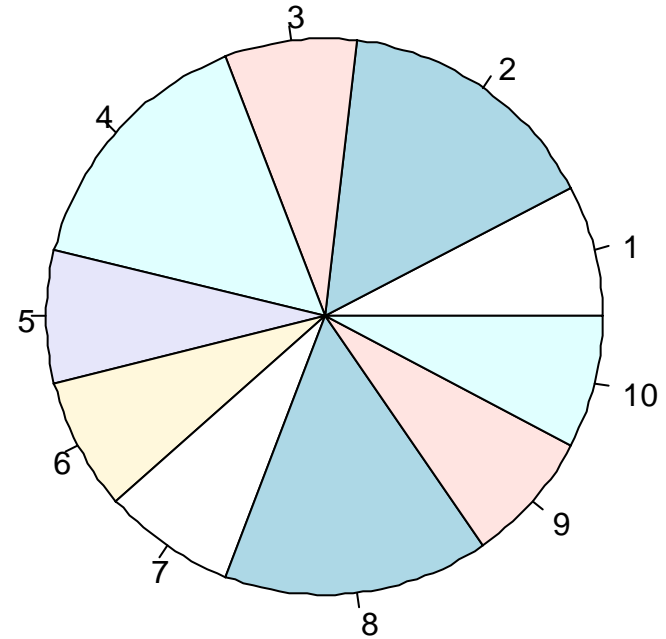A pie chart is a circle partitioned into segments where each of the segments represents a category.

The size of each segment depends upon the relative frequency and is determined by the angle (frequency x 360^0).

```
pie(x, labels = names(x), …)
```
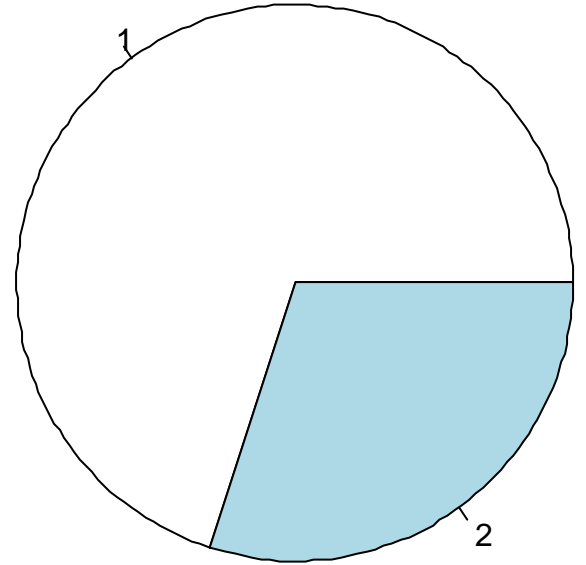
Pie diagram:
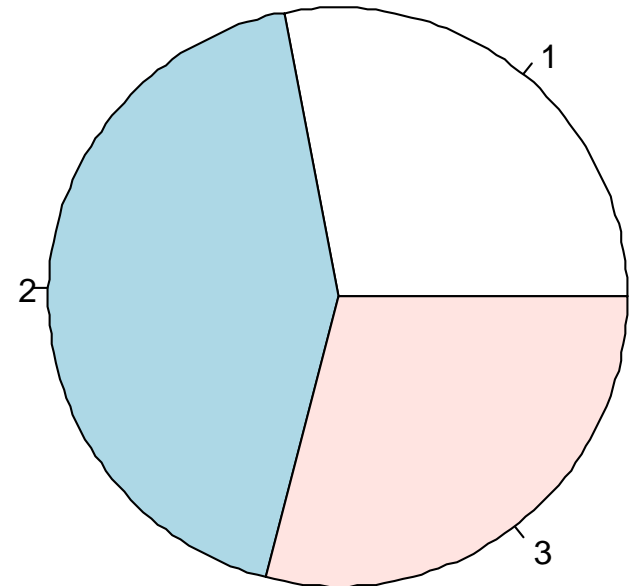## Example

> **`pie(gender)`**

Do you want this?

Pie diagram:
Example

> `pie(table(gender))`

> `pie(table(direction))`

Histogram:

Histogram is based on the idea to categorize the data into different groups and plot the bars for each category with height.

The area of the bars (= height X width) is proportional to the relative frequency.

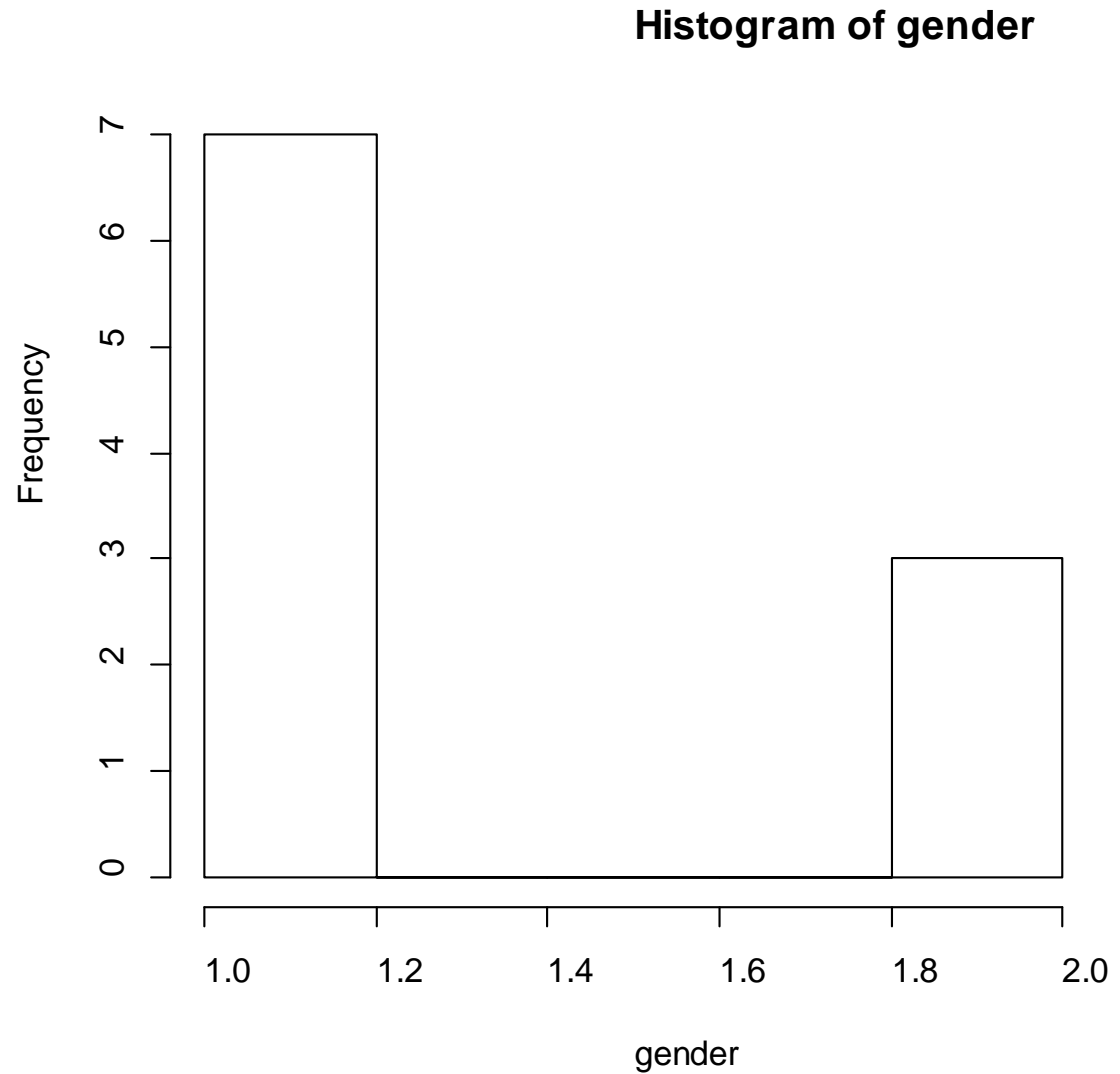So the widths of the bars need not necessarily to be the same

```
hist(x) # show absolute frequencies
hist(x, freq=F) # show relative frequencies
```

See `help("hist")` for more details

Histogram:
Example

> `hist(gender)`

Histogram of gender

Histogram:
Example

```
> hist(direction)
```

Histogram of direction

direction