Data Handling and Data Mining

Fixing The Sparrow Data Set

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BASIC STATISTICS FOR BIOLOGISTS

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Summary:

These are the solutions to the exercises contained within the handout to A Primer For Statistical Tests which walks you through the basics of variables, their scales and distributions. Keep in mind that there is probably a myriad of other ways to reach the same conclusions as presented in these solutions.

Contents

1. Loading the R Environment Object

```
load("Data/Primer.RData")  # load data file from Data folder
```

2. Variables

2.1 Finding Variables

```
ls()  # list all elements in working environment
```

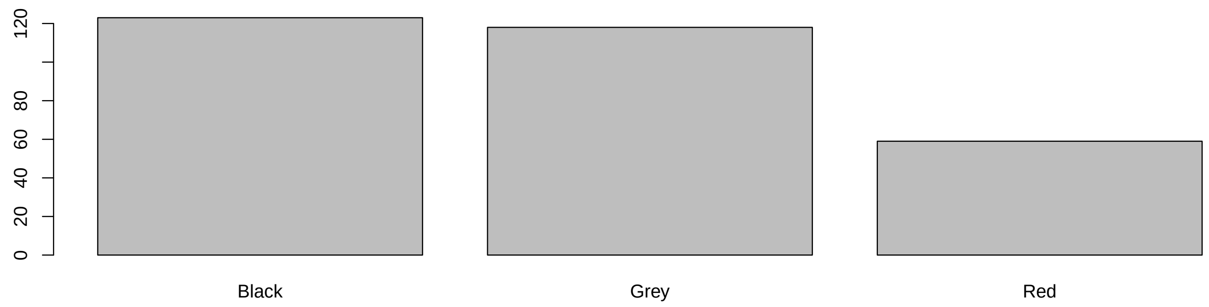
```
## [1] "Colour"                "Depth"                 "IndividualsPassingBy"
## [4] "Length"                "Reproducing"           "Sex"
## [7] "Size"                  "Temperature"
```

2.2 Colour

```
class(Colour)  # mode
```

```
## [1] "character"
```

```
barplot(table(Colour))  # fitting?
```



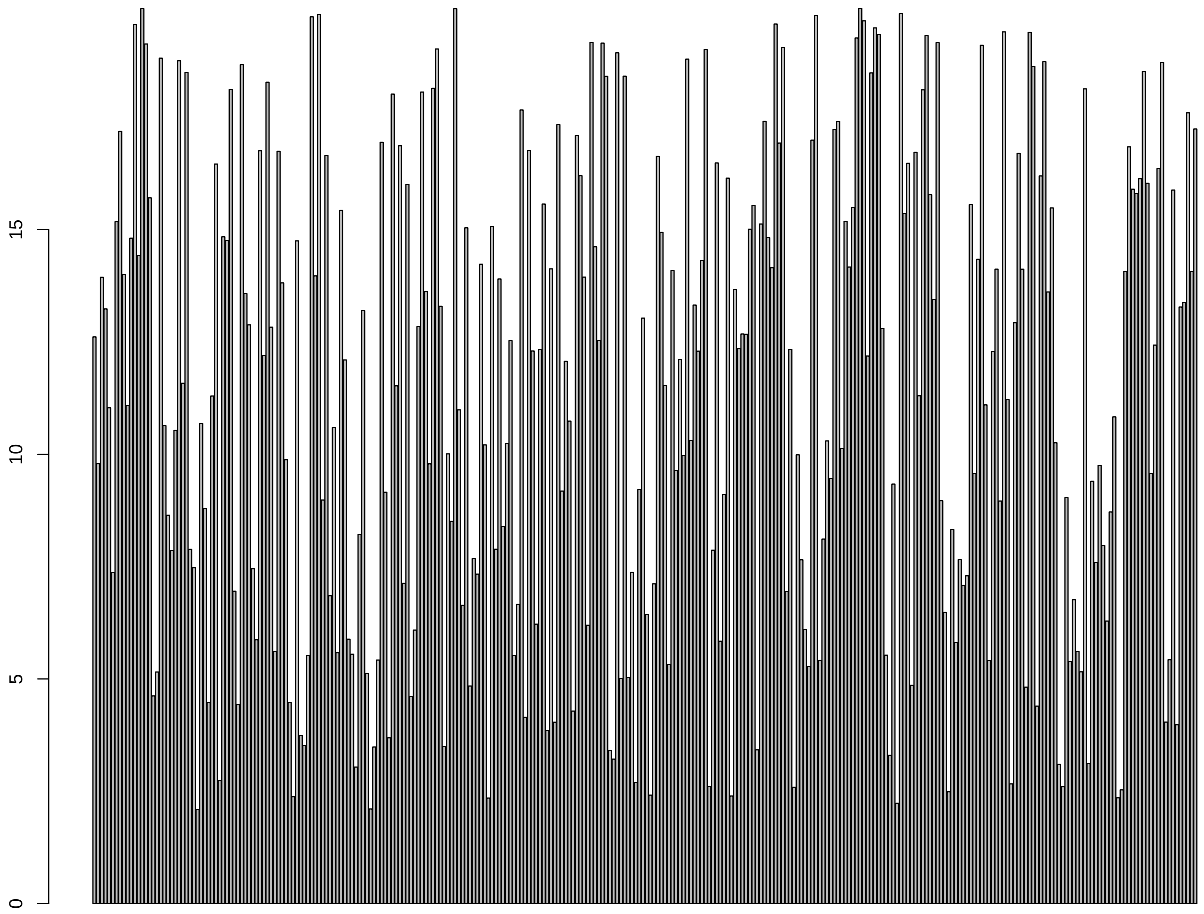
Question	Answer
Mode?	character
Which scale?	Nominal
What's implied?	Categorical data that can't be ordered
Does data fit scale?	Yes

2.3 Depth

```
class(Depth)  # mode
```

```
## [1] "numeric"
```

```
barplot(Depth)  # fitting?
```



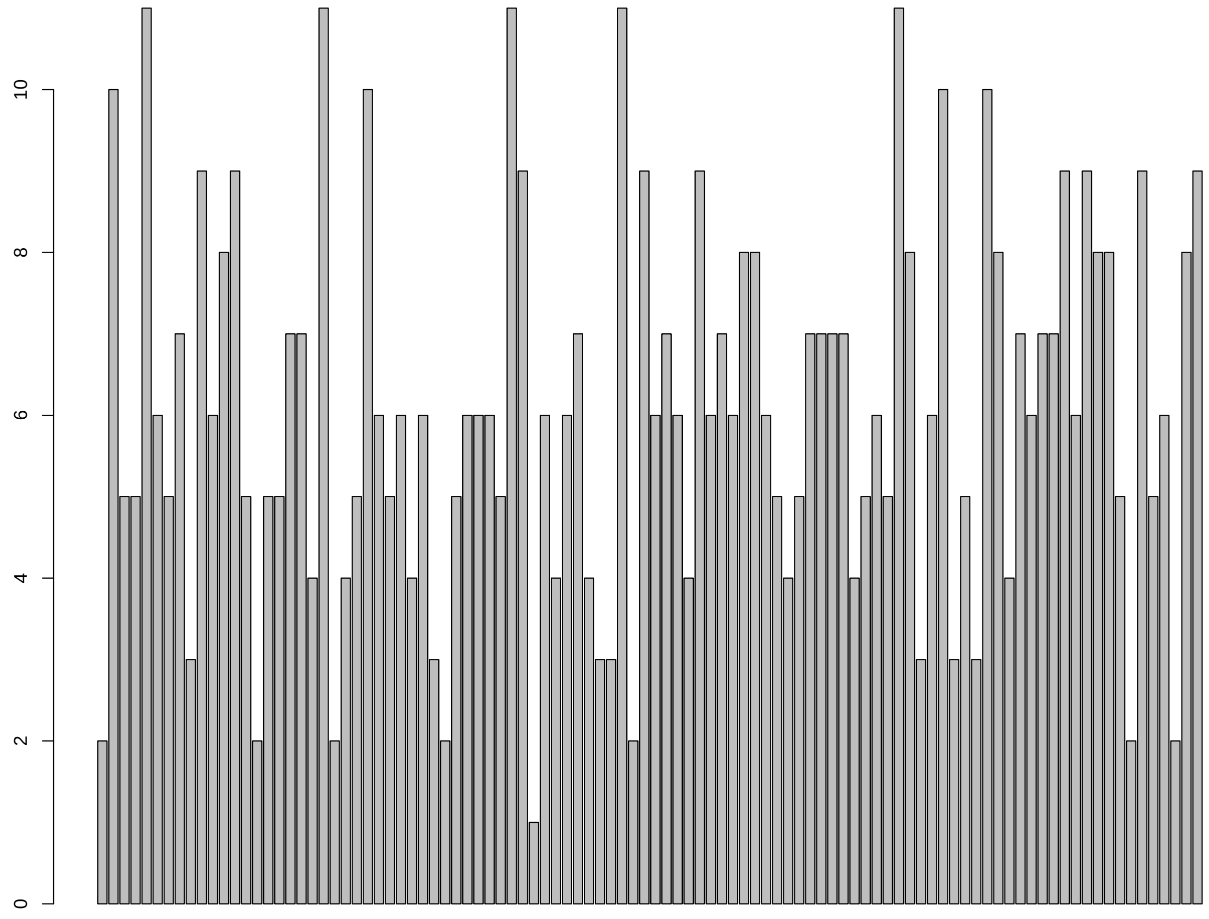
Question	Answer
Mode?	numeric
Which scale?	Interval/Discrete
What's implied?	Continuous data with a non-absence point of origin
Does data fit scale?	Debatable (is 0 depth absence of depth?)

2.4 IndividualsPassingBy

```
class(IndividualsPassingBy)  # mode
```

```
## [1] "integer"
```

```
barplot(IndividualsPassingBy)  # fitting?
```



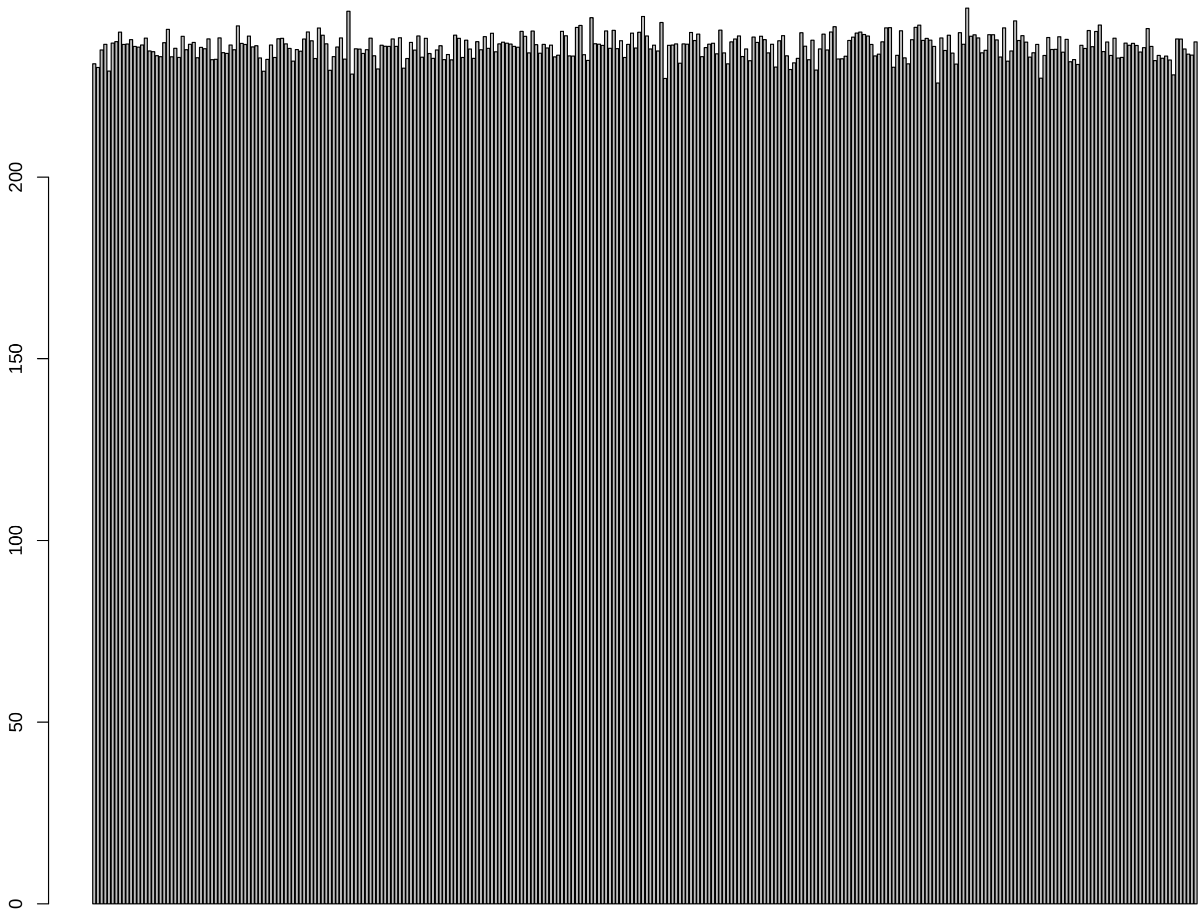
Question	Answer
Mode?	integer
Which scale?	Integer
What's implied?	Only integer numbers with an absence point of origin
Does data fit scale?	Yes

2.5 Length

```
class(Length)  # mode
```

```
## [1] "numeric"
```

```
barplot(Length)  # fitting?
```



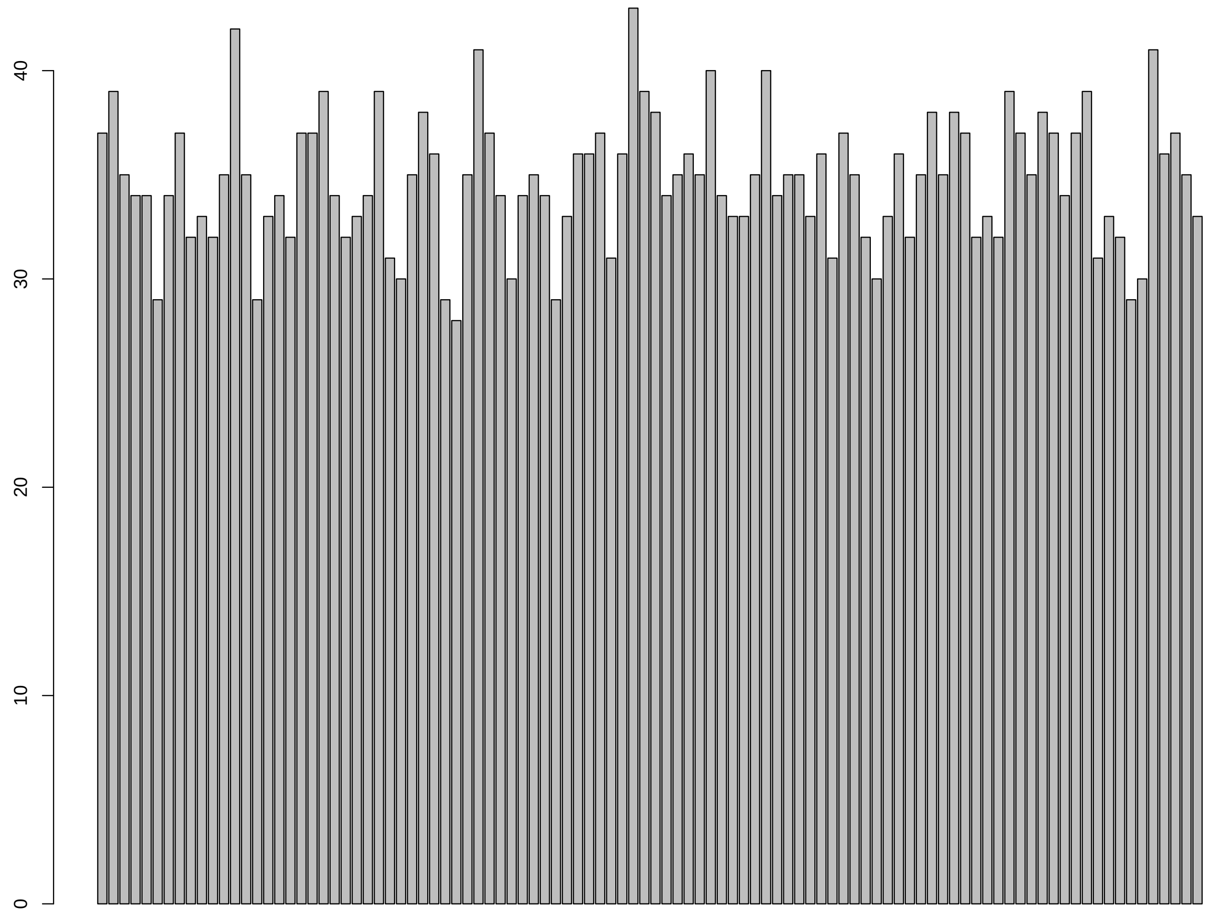
Question	Answer
Mode?	numeric
Which scale?	Relation/Ratio
What's implied?	Continuous data with an absence point of origin
Does data fit scale?	Yes

2.6 Reproducing

```
class(Reproducing)  # mode
```

```
## [1] "integer"
```

```
barplot(Reproducing)  # fitting?
```



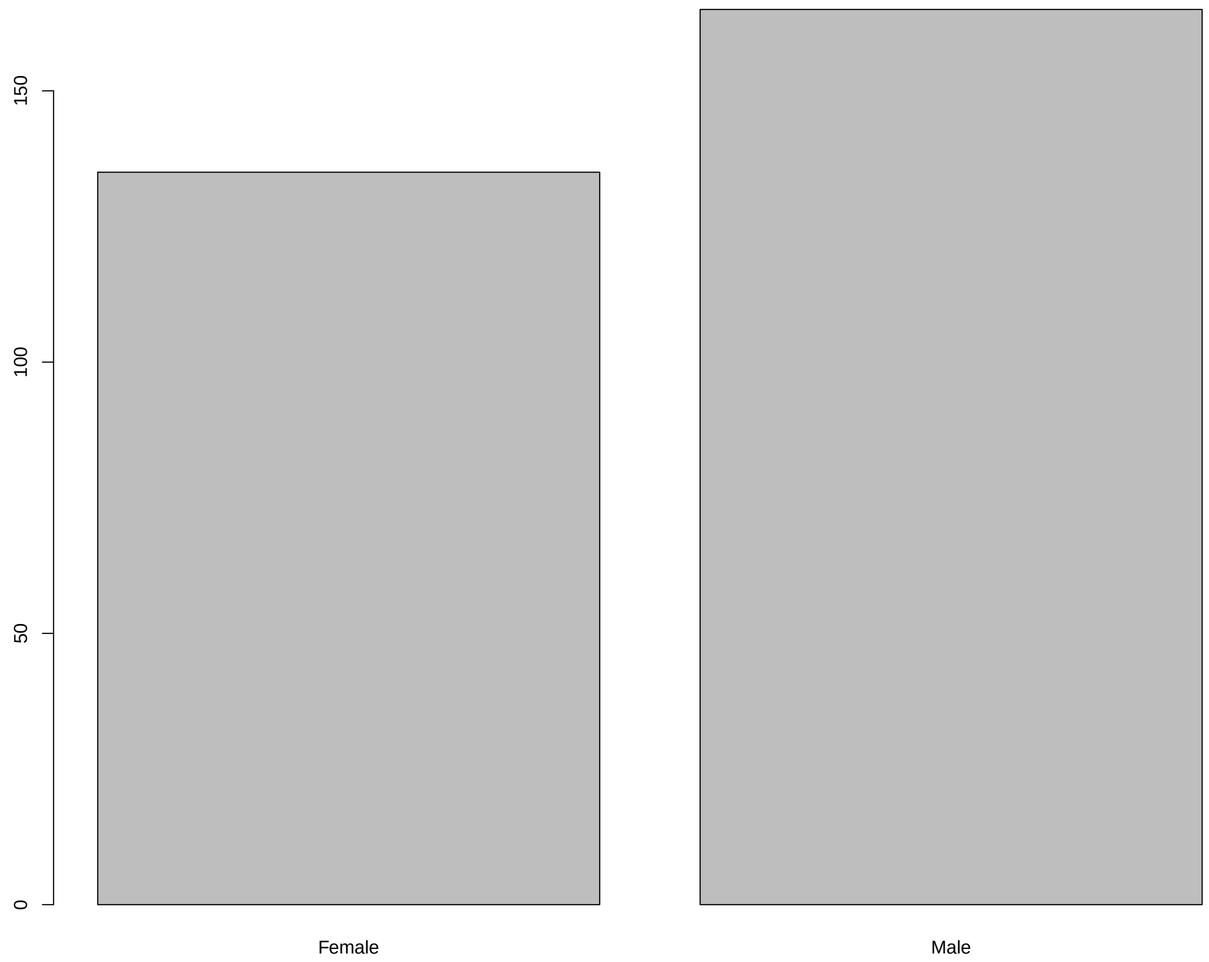
Question	Answer
Mode?	integer
Which scale?	Integer
What's implied?	Only integer numbers with an absence point of origin
Does data fit scale?	Yes

2.7 Sex

```
class(Sex)  # mode
```

```
## [1] "factor"
```

```
barplot(table(Sex))  # fitting?
```



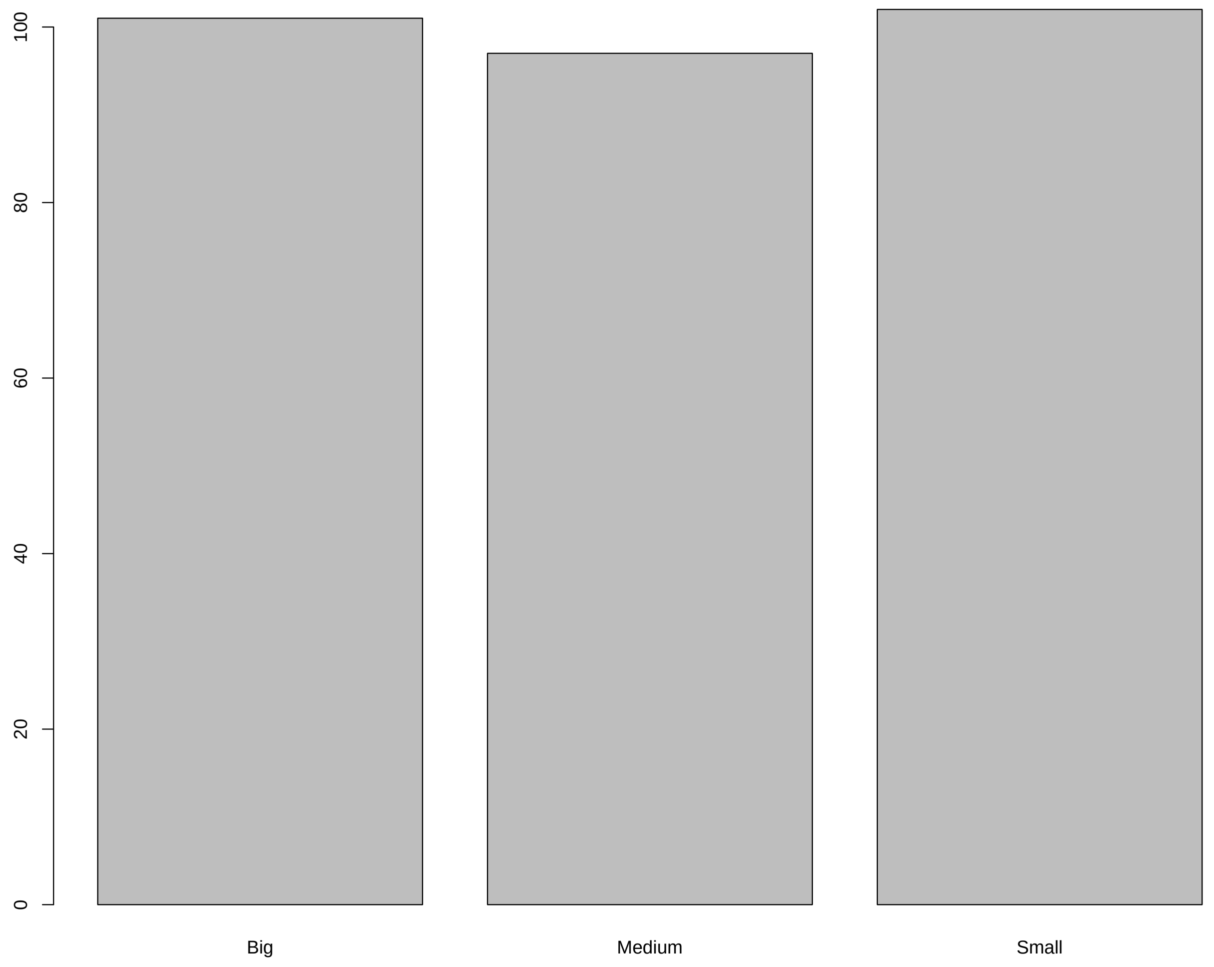
Question	Answer
Mode?	factor
Which scale?	Binary
What's implied?	Only two possible outcomes
Does data fit scale?	Yes

2.8 Size

```
class(Size)  # mode
```

```
## [1] "character"
```

```
barplot(table(Size))  # fitting?
```



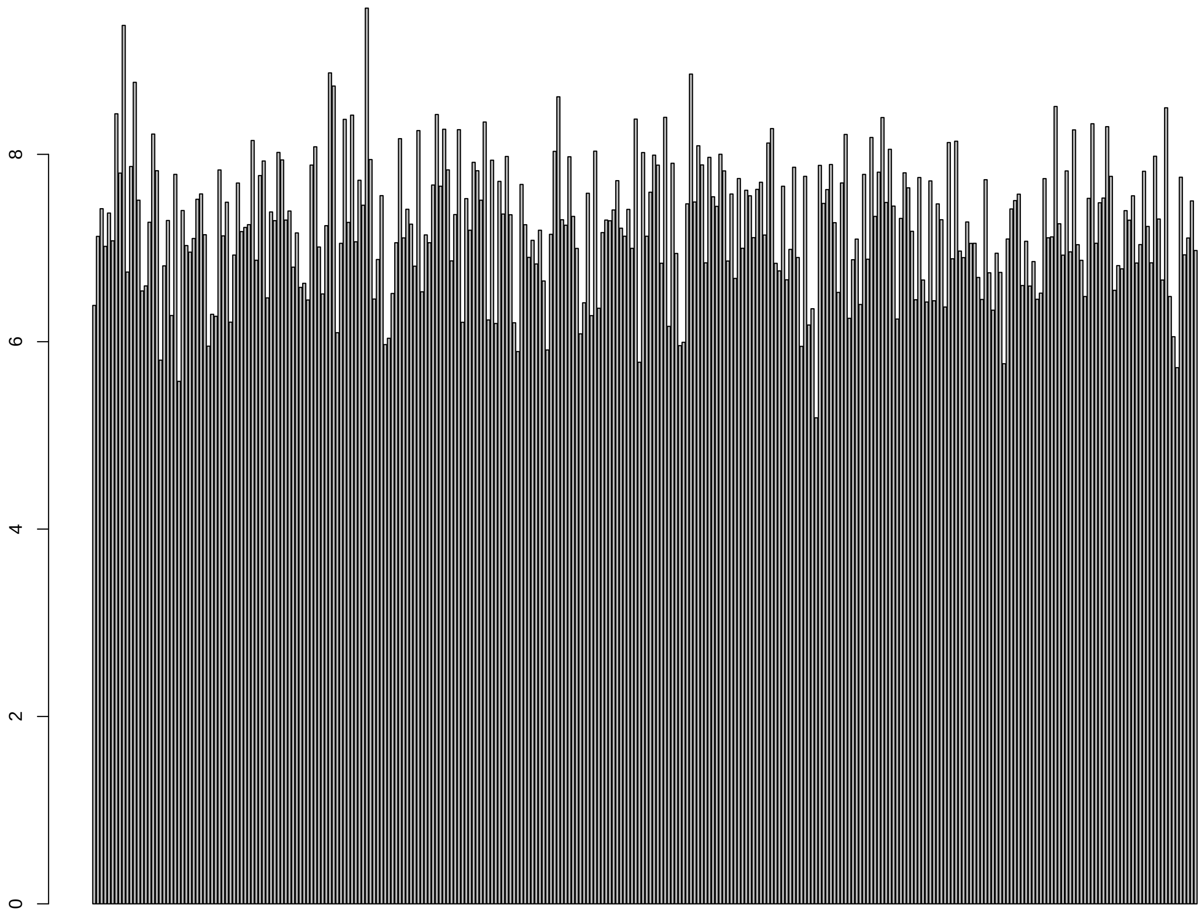
Question	Answer
Mode?	character
Which scale?	Ordinal
What's implied?	Categorical data that can be ordered
Does data fit scale?	Yes

2.9 Temperature

```
class(Temperature)  # mode
```

```
## [1] "numeric"
```

```
barplot(Temperature)  # fitting?
```

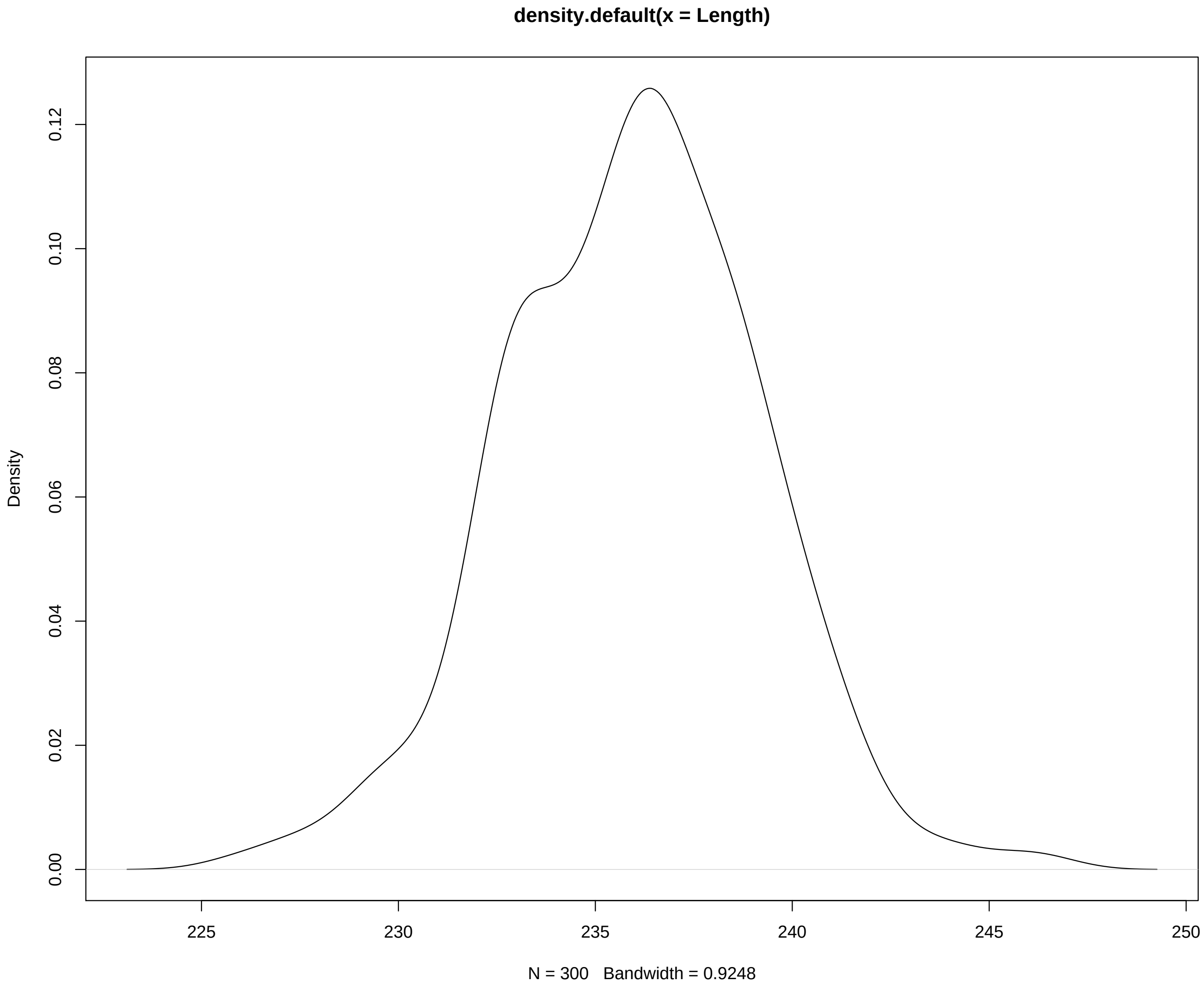


Question	Answer
Mode?	numeric
Which scale?	Interval/Discrete
What's implied?	Continuous data with a non-absence point of origin
Does data fit scale?	Yes (the data is clearly recorded in degree Celsius)

3. Distributions

3.1 Length

```
plot(density(Length))  # distribution plot
```



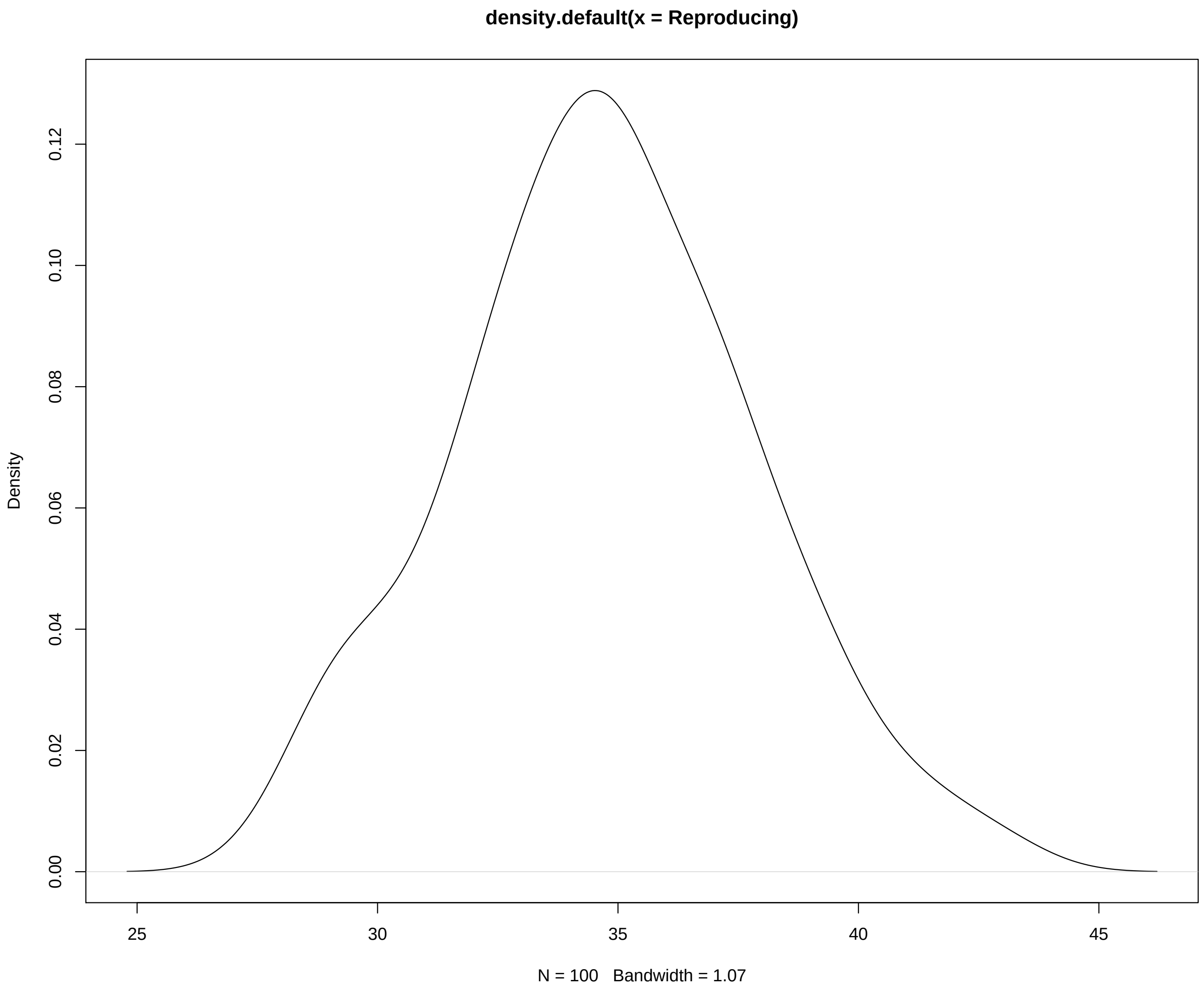
```
shapiro.test(Length)  # normality check
```

```
##
##  Shapiro-Wilk normality test
##
## data:  Length
## W = 1, p-value = 0.4
```

The data is **normal distributed**.

3.2 Reproducing

```
plot(density(Reproducing))  # distribution
```



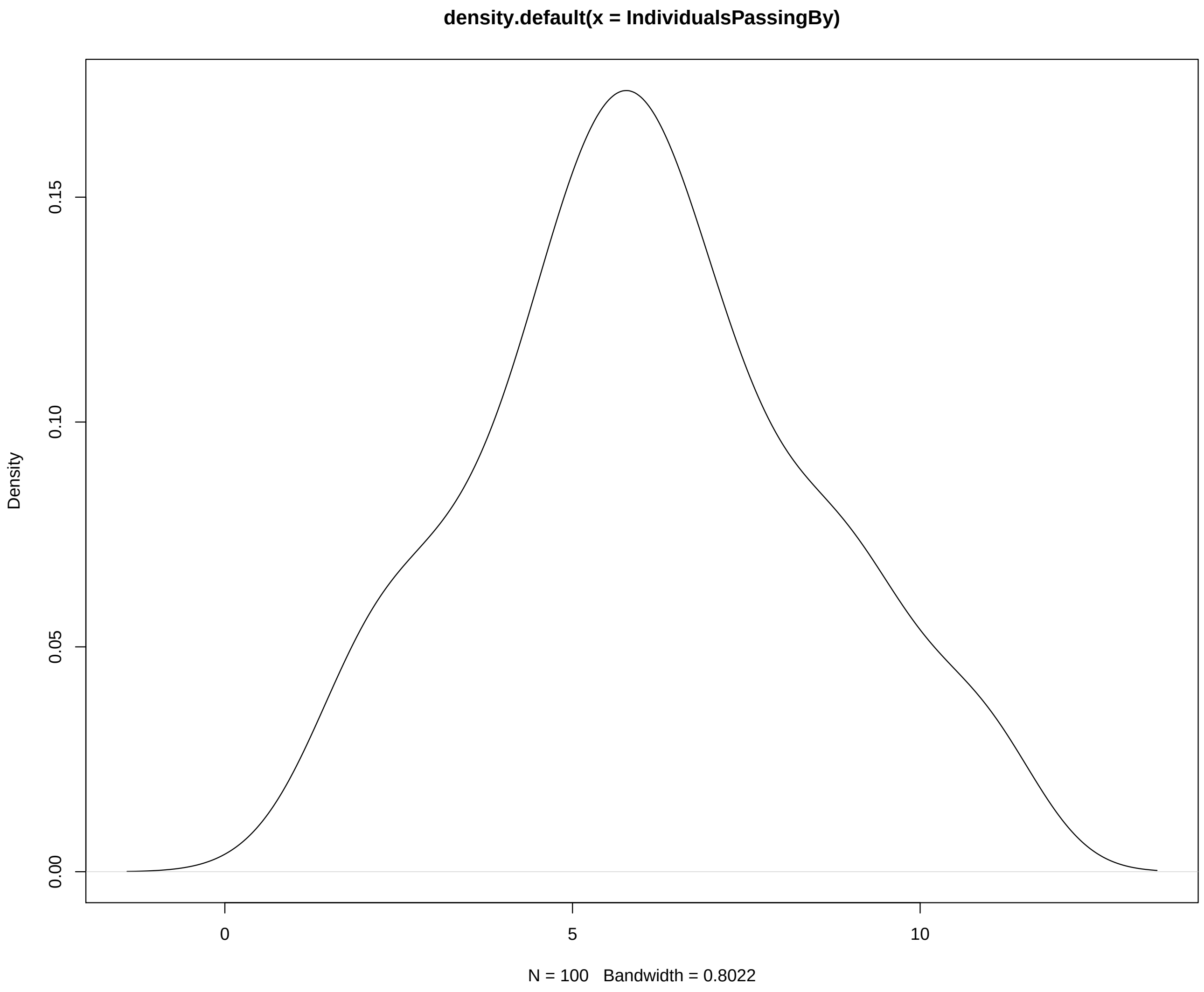
```
shapiro.test(Reproducing)  # normality check
```

```
##
##  Shapiro-Wilk normality test
##
## data:  Reproducing
## W = 1, p-value = 0.3
```

The data is **binomial distributed** (i.e. “How many individuals manage to reproduce”) but looks **normal distributed**. The normal distribution doesn’t make sense here because it implies continuity whilst the data only comes in integers.

3.3 IndividualsPassingBy

```
plot(density(IndividualsPassingBy))  # distribution
```



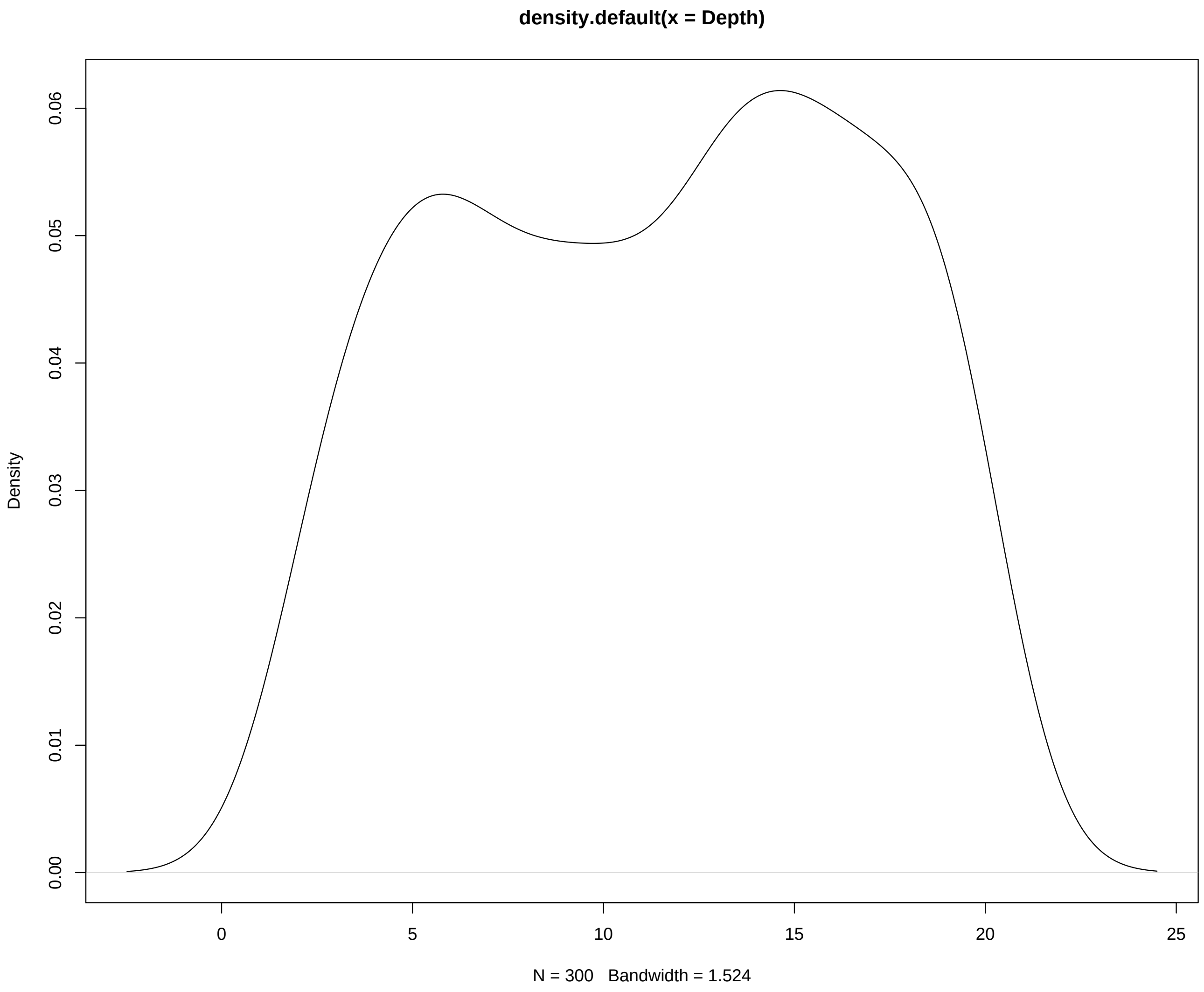
```
shapiro.test(IndividualsPassingBy)  # normality check
```

```
##
##  Shapiro-Wilk normality test
##
## data:  IndividualsPassingBy
## W = 1, p-value = 0.02
```

The data is **poisson distributed** (i.e. “How many individuals pass by an observer in a given time frame?”).

3.4 Depth

```
plot(density(Depth))  # distribution
```



The data is **uniform distributed**. You don't know this distribution class from the lectures and I only wanted to confuse you with this to show you that there's much more out there than I can show in our lectures.