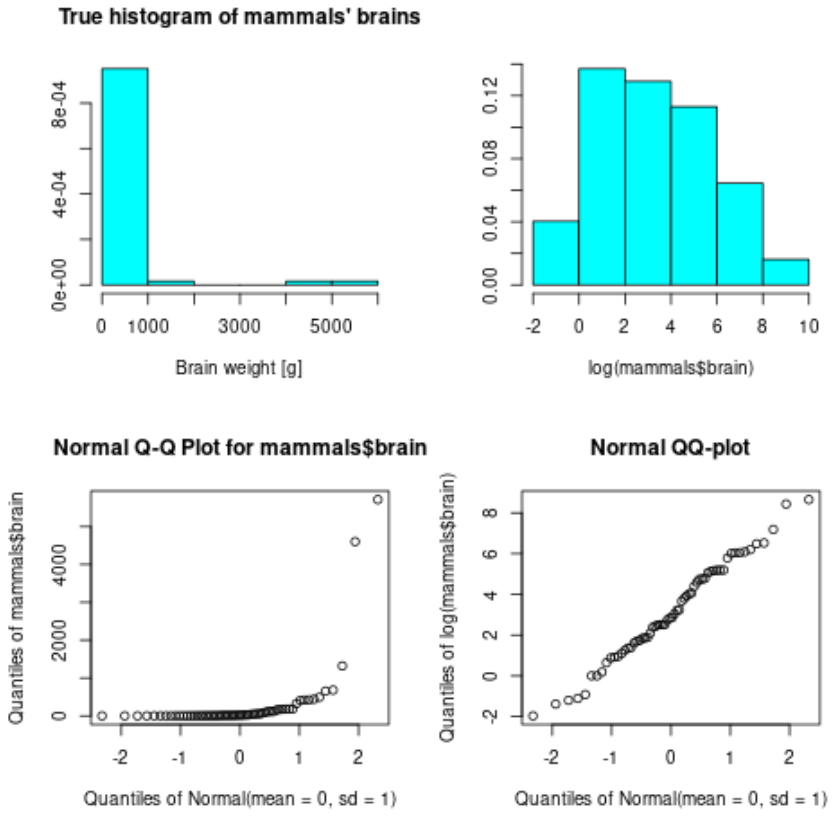
In the last lecture, you saw some plots from the `mammals` data frame of the `MASS` package, giving body weights and brain weights for 62 animals.



The `Animals2` data frame from the `robustbase` package gives the same characterizations for a different set of animals.

In both cases, the row names for these data frames identify these animals, and the objective of this exercise is to examine the differences between the animals characterized in these data frames:

1. Make the required packages available.

   Tip: packages need to be installed (once) and loaded (per session).

   Use this code block to start a session and run the necessary commands:

   ...

Remember when asked to start the session in the same directory where your practice file resides.

—– SOLUTION —–

- Install `MASS` and `robustbase` install using `install.packages`. You have to do this only once (unless you upgrade or change your version of R).
- Load the packages.

```
library(MASS)
library(robustbase)
```

2. The `rownames` function returns a vector or row names for a data frame, and the `intersect` function computes the intersection of two sets, returning a vector of their common elements.

   Using these functions, construct and display the vector `commonAnimals` of animal names common to both data frames.

   How many animals are included in this set? Tip: you can check the length of a vector with the function `length`.

   —– SOLUTION —–

   - Check both data frames with `str`.

```
str(Animals2)
str(mammals)
```

```
'data.frame': 65 obs. of  2 variables:
 $ body : num  1.35 465 36.33 27.66 1.04 ...
 $ brain: num  8.1 423 119.5 115 5.5 ...
'data.frame': 62 obs. of  2 variables:
 $ body : num  3.38 0.48 1.35 465 36.33 ...
 $ brain: num  44.5 15.5 8.1 423 119.5 ...
```

   - Look at row names with `rownames`.

```
rownames(Animals2)
rownames(mammals)
```

   - Check the use of `intersect` with `help(intersect)`.
   - Store the intersection using `intersect` in `commonAnimals`.

```
commonAnimals <- intersect(rownames(Animals2), rownames(mammals))
commonAnimals
```

- Check the length of `commonAnimals` with `length` or `str`.

```
length(commonAnimals)
str(commonAnimals)
```

```
[1] 58
chr [1:58] "Mountain beaver" "Cow" "Grey wolf" "Goat" "Guinea pig" "Asian ele
```

3. The `setdiff` function returns a vector of elements contained in one set but not in the other: `setdiff(A,B)~` returns a vector of elements in set `A` that are not in set `B`.

   Use `setdiff` to display the animals present in `mammals` that are **not** present in `Animals2`.

   —– SOLUTION —–

```
setdiff(rownames(mammals), rownames(Animals2))
```

```
[1] "Arctic fox"             "Arctic ground squirrel" "Patas monkey"
[4] "Mole rat"
```

4. Use `setdiff` to display the animals present in `Animals2` that are **not** present in `mammals`.

   —– SOLUTION —–

```
setdiff(rownames(Animals2), rownames(mammals))
```

```
[1] "Dipliodocus"           "Potar monkey"          "Triceratops"
[4] "Brachiosaurus"         "Mole"                  "Artic fox"
[7] "Artic ground squirrel"
```

5. Can you give a simple (qualitative) characterization of these differences between the two sets of animals?

   Tip: you have to look at the output of the last two tasks to identify these differences.

   —– SOLUTION —–

(a) The `Animals2` data frame contains three dinosaurs ("Triceratops", "Dipliodocus", and "Brachiosaurus")

(b) The word "Arctic" is misspelled in `Animals2` - "Arctic fox" and "Arctic ground squirrel" are actually in both data frames.

(c) `mammals` lists "Mole rat" while `Animals2` lists "Mole" but body and brain weights are the same:

```
mammals["Mole rat",]
Animals2["Mole",]
```

```
          body brain
Mole rat 0.122     3
body brain
Mole 0.122     3
```

More detailed using `which` for indices and `rownames` with `==`:

```
mammals[which(rownames(mammals) == "Mole rat"),]
Animals2[which(rownames(Animals2) == "Mole"),]
```

```
          body brain
Mole rat 0.122     3
body brain
Mole 0.122     3
```

(d) `mammals` lists "Patas monkey" while `Animals2` lists "Potar monkey" but body and brain weights are the same:

```
mammals["Patas monkey",]
Animals2["Potar monkey",]
```

```
             body brain
Patas monkey   10   115
body brain
Potar monkey   10   115
```

6. Make some meaningful plots! (Next week.)