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ECO 634
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Lab 4: Uncertainty and Error

1.

```
norm_17 <- rnorm(n = 17, mean = 10.4, sd = 2.4)
norm_30 <- rnorm(n = 30, mean = 10.4, sd = 2.4)
norm_300 <- rnorm(n = 300, mean = 10.4, sd = 2.4)
norm_3000 <- rnorm(n = 3000, mean = 10.4, sd = 2.4)
```

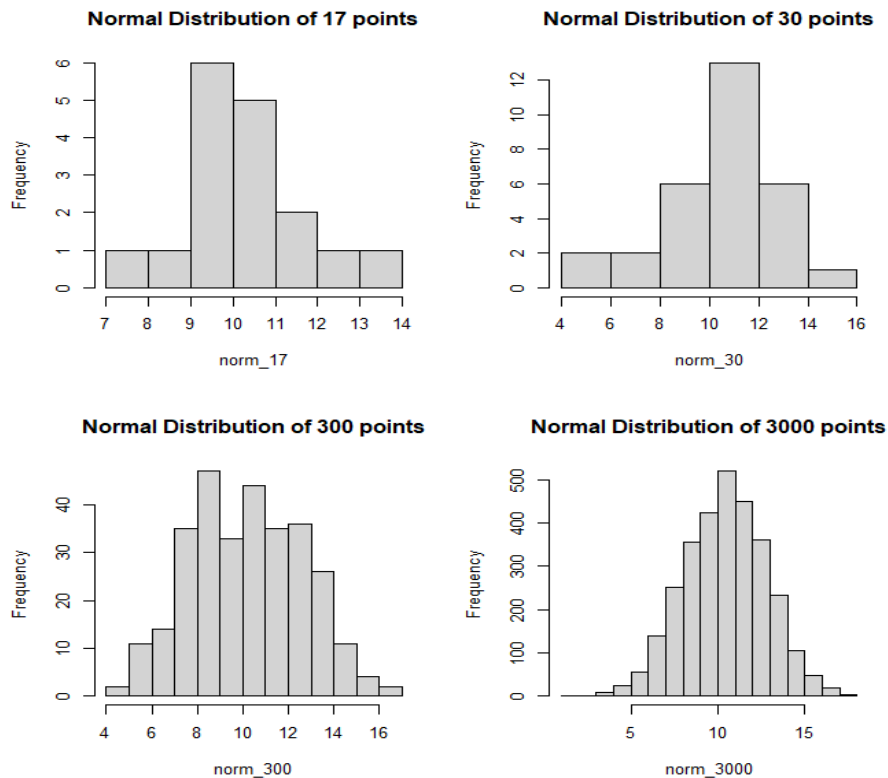
2.

```
par(mfrow= c(2,2))
```

```
hist(norm_17)
hist(norm_30)
hist(norm_300)
hist(norm_3000)
```

```
png(filename = here("lab_04_hist_01.png"), width = 1500, height = 1600,
     res = 120, units = "px")
```

3.



4. In the plots with lower #, the points aren't very *normal*-looking. The lower value plots seem skewed

5. The shapes of the distributions are different because when the sample size n is increased, the distributions become increasingly bell-shaped and normally distributed.

6. The parameters for the standard normal distribution are the mean and the standard deviation from the mean. The standard values are a mean of zero and a standard deviation of one.

7.

```
x <- seq(0, 20, length.out = 1000)
y <- dnorm(x, mean=10.4, sd=2.4)
plot(x, y,
     type = "l",
     main = "Normal density distribution (mean = 10.4, sd = 2.4)")
abline(v=10.4)
```

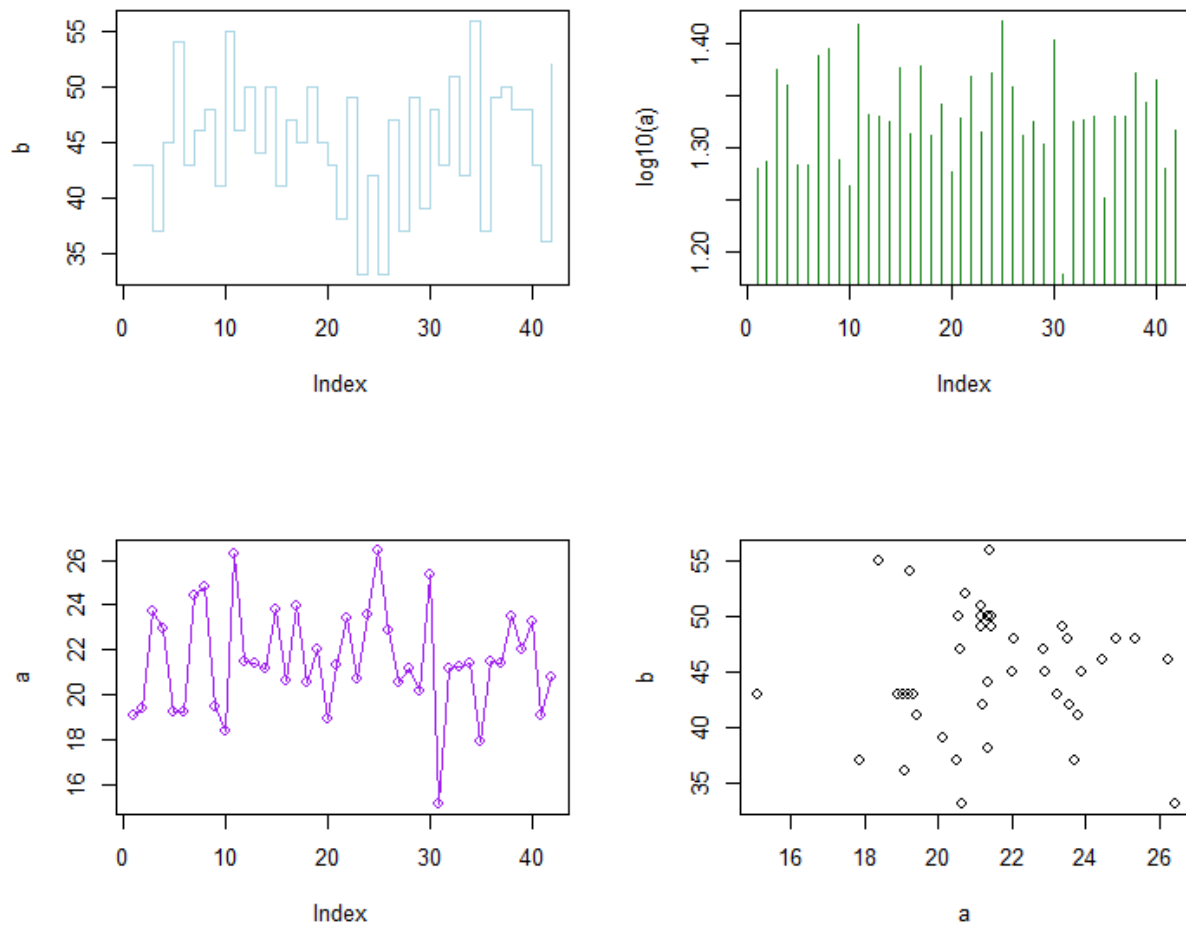
8.

9.

```
set.seed(42)
a <- rnorm(42, mean = 21, sd = 2)
```

```
plot(log10(a),
     type = "b",
     cex = 2,
     pch = 1,
     col = c("blue", "red"))
```

10.



11.

```
n_pts = 10
x_min = 1
x_max = 10
```

```
x_random = runif(n = n_pts, min = x_min, max = x_max)
y_random = rnorm(n = n_pts)
```

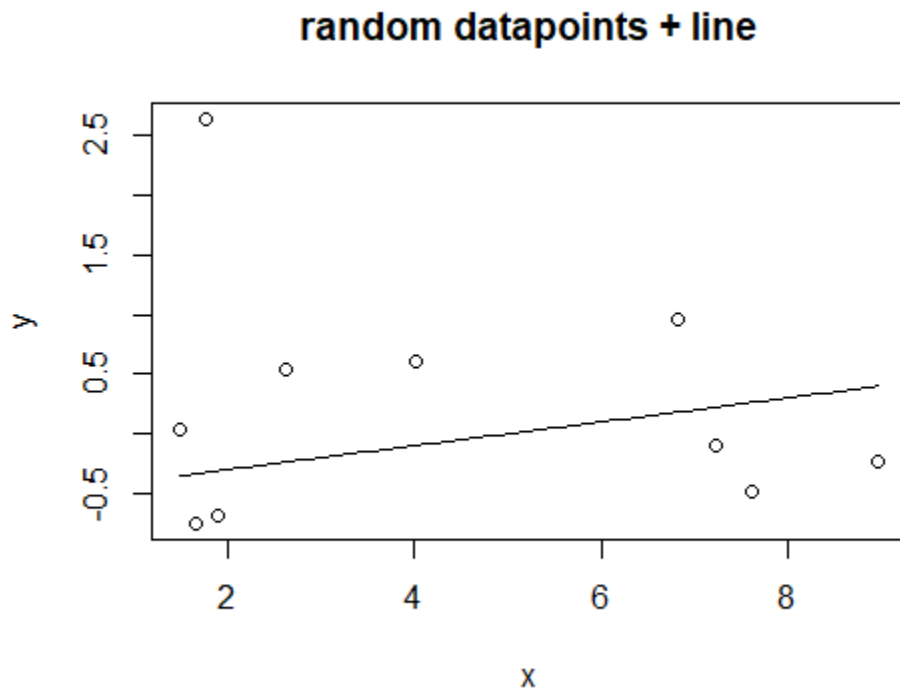
```
guess_x <- 5
guess_y <- 0
```

```

guess_slope <- 0.1
plot(y~x, data = dat_random)
curve(line_point_slope(x, guess_x, guess_y, guess_slope), add = T)

```

12.



13.

```

dat_random[,3] <- line_point_slope(dat_random$x, guess_x, guess_y, guess_slope)
names(dat_random)[3] <- "y_predicted"

```

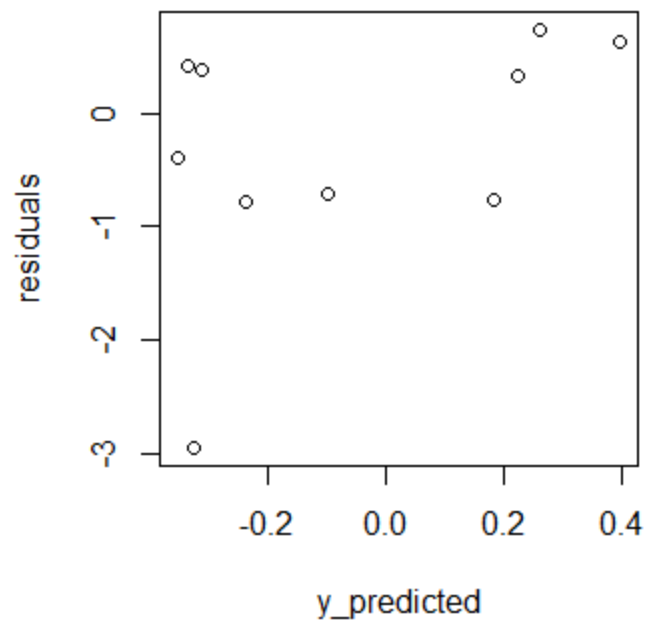
```

residual <- (dat_random$y_predicted - dat_random$y)
dat_random[,4] <- residual
names(dat_random)[4] <- "residuals"

```

14.

Predicted Y-values vs residuals



Predicted model residuals

