Problem 4

Exercise 28 on page 449.

The data suggests the true average lateral recumebcy time is less than 20 mins.

Hypotheses

$$H_0: \quad \mu = \mu_0 = 20 \text{ mins}$$

$$H_a: \quad \mu < \mu_0$$

Rejection region

$$z \leqslant -z_\alpha$$

$$-z_\alpha = -z_{0.1} = -1.28$$

Test statistic

$$z = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} = \frac{18.6 - 20}{8.6/\sqrt{73}} = -1.39$$

The null hypothesis should be rejected

$$-1.39 < -1.28 \implies z < -z_\alpha$$

Calculations:

```
n <- 73;
x_bar <- 18.6;
S <- 8.6;
mu_0 <- 20;
alpha <- 0.1;
z_alpha <- qnorm(0.1)
z <- (x_bar - mu_0)/(S/sqrt(n))
reject_h0 <- z < z_alpha # TRUE
```