1. (10) The built-in data set `faithful` gives data on eruptions of the Old Faithful geyser in Yellowstone National Park. Each observation has a length of time the eruption lasted (eruptions) and the length of time until the next eruption (waiting), both in minutes.
   (a) Find the equation of the regression line to explain waiting as a function of eruptions.
   (b) How long do you expect to wait after a 4.3 minute eruption?

Questions 2, 3, and 4 use the data set `malaria` from `library(ISwR)` which observed 100 children in Ghana. The data records each child’s age, levels of a particular antibody, and whether or not they have malaria symptoms.

2. (10) State and carry out a hypothesis test that the antibody levels (ab) differ between the groups with and without malaria symptoms. Use the Wilcoxon rank-sum test.
(10) 3. (a) Inspect a histogram of the ab variable. Would you use this variable in a t-test? Explain.

(b) Inspect a histogram of log(ab). Would you use this variable in a t-test? Explain.

(c) Carry out a t-test that antibody levels differ between malaria groups and report your results. Use the variable from part (a) or (b) that best satisfies the conditions of the t-test.

(10) 4. Is there a relationship between age and antibody level? Make a linear model with age as explanatory and log(ab) as response. Report and interpret the p-value.
Suppose a population has IQ scores normally distributed with mean 90 and sd 15. We take a sample of 10 subjects and perform a t-test against the null hypothesis $H_0 : \mu = 100$ at the $\alpha = 0.05$ level of significance.

Use simulation to determine the power of this test. That is, how often does the test correctly reject $H_0$?