Group-Homework-statistics for Data science

Instruction:
Homework assignments must bedone in group. You are not allowed to collaborate with other group of students beyond exchanging ideas at a very general level. Attach both the pdf and R code together.

1) Two methods are applied to train patients with senile dementia to care for themselves. After the completion of the training, patients are asked to take 20 tests involving activities of daily living. The response from each patient is the proportion of his or her tests that are successful. The data for the two groups are given below:
Group 1: 0.05, 0.15, 0.35, 0.25, 0.20, 0.05, 0.10, 0.05, 0.30, 0.05, 0.25
Group 2: 0, 0.15, 0, 0.05, 0, 0, 0.05, 0.10.
(i) Conduct a t test for the difference between the two groups based on the data. Comment on the appropriateness of this t-test.
(ii) Transform the data to $Y = sqrt(X)$. Conduct a t test for the difference between the two groups based on the transformed data. Compare the result with that in part (i).

2) Obesity is very common in American society and is a risk factor for breast cancer in postmenopausal women. One mechanism explaining why obesity is a risk factor is that it may raise estrogen levels in women. In particular, one type of estrogen, serum estradiol, is a strong risk factor for breast cancer. To better assess these relationships, researchers studied a group of 151 African-American and 60 Caucasian premenopausal women. Adiposity was measured in two different ways: BMI = weight $(kg)/height^2(m^2)$ and waist-hip ratio (WHR) = waist circumference/hip circumference. BMI is a measure of overall adiposity, whereas WHR is a measure of abdominal adiposity. In addition, a complete hormonal profile was obtained, including serum estradiol (ES 1). Finally, other breast-cancer risk factors were also assessed among these women, including:
(1) ethnicity (ETHNIC = 1 if African-American, = 0 if Caucasian),
(2) age (ENTAGE),
(3) parity (NUMCHILD = number of children),
(4) age at first birth (AGEFBO),
(5) any children (ANYKIDS = 1 if yes, = 0 if no),
(6) age at menarche (AGEMNRCH = age when menstrual periods began).

The data are provided in Data Set ESTRADL.DAT.
(a) Is there a crude association between either measure of adiposity (BMI, WHR), considered separately, and serum estradiol?
(b) Are these relationships similar for Caucasian and African-American women?
(c) Do the relationships between the adiposity measures and serum estradiol persist after controlling for the other breast-cancer risk factors in list items 1 to 6?
(d) One debate in the breast-cancer literature is whether overall adiposity (BMI) or central (abdominal) adiposity (WHR) is a better indicator of breast-cancer risk. Perform analyses to inform the debate as to which measure of adiposity is more closely related to serum estradiol either crudely or after adjusting for other breast-cancer risk factors.