**HOMEWORK**

**DUE DECEMBER 13/20, 2017**

***Solve each problem by hand, specifying the hypothesis tested the test statistic and also run the analysis using R. Interpret the results and state your conclusion.***

***Complete solutions will receive 6 points for each of the six problems; partial solutions will receive no more than 5 points each.***

1. The literature published by a company that manufactures hearing aid batteries claims that a certain model battery has an average life of 7 hours (μ=7) and a variance of 5 hours (σ2=5). A customer who uses the hearing aid battery believes that the value stated in the literature for the variance is too low. In order to test his hypothesis the customer records the following times (in hours) for ten batteries he purchases during the month of October: 5,6,4,3,11,12,9,13,6,8. Do the data indicate that the variance for the battery time is some other value than 5?
2. A physician states that the median number of times he sees each of his patients during the year is five. In order to evaluate the validity of this statement, he randomly selects ten of his patients and determines the number of office visits each of them made during the past year. He obtains the following values for the ten patients in his sample: 9,10,8,4,8,3,0,10,15,9. Do the data support his claim that the median number of times he sees a patient is five?
3. A researcher conducts a study to evaluate whether or not the distribution of the length of time it takes migraine patients to respond to a 100mg dose of an intravenously administered drug is normal, with a mean response time of 90 seconds and a standard deviation of 35 seconds. The amount of time (in seconds) that elapses between the administration of the drug and the cessation of a headache for 30 migraine patients is recorded below. The 30 scores are arranged ordinally: 21,32,38,40,48,55,63,66,70,75,80,84,86,90,90,93,95,98,100,105,106,108,115,118,126,128,130,142,145,155.

Do the data conform to a normal distribution with the specified parameters?

1. In order to assess the efficacy of a new antidepressant drug, ten clinically depressed patients are randomly assigned to one of two drugs. Five patients are assigned to Group 1, which is administered the antidepressant drug for a period of six months. The other five patients are assigned to Group 2, which is administered a placebo during the same six month period. Assume that prior to introducing the experimental treatments; the experimenter confirmed that the level of depression in the two groups was equal. After six months elapse all ten subjects are rated by a psychiatrist (who is blind with respect to a subject’s experimental condition) on their level of depression. The psychiatrist’s depression ratings for the five subjects in each group follow 9the higher the rating, the more depressed the subjects):

* Group 1: 11,1,0,2,0;
* Group 2: 11, 11,5,8,4

Do the data indicate that the antidepressant drug is effective?

1. A psychologist conducts a study to determine whether or not people exhibit more emotionality when they are exposed to violence explicit words than when they are exposed to neutral words. Each of the ten subjects is shown a list of 16 randomly arranged words, which are projected onto a screen one at a time for a period of five seconds. Eight of the words on the list are violence explicit and eight of the words are neutral. As each word is projected on the screen, a subject is instructed to say the word to himself or herself. As a subject does this, sensors attached to the palms of the subject’s hand record galvanic skin response (GSR), which is used by the psychologist as a measure of emotionality. The psychologist computes two scores for each subject, one score for each of the experimental conditions:

* **Condition 1**: GSR/Explicit: the average GDR score for eight violence explicit words
* **Condition 2**: GSR/Explicit: the average GDR score for eight neural words

The GSR/Explicit and the GSR/Neutral scores for the ten subjects are as follows (the higher the scores, the higher the level of emotionality)

**Subject 1**: (9,8); **Subject 2**: (2,2); **Subject 3:** (1,3); **Subject 4:** (4,2); **Subject 5**: (6,3); **Subject 6**: (4,0); **Subject 7:** (7,4); **Subject 8:** (8,5); **Subject 9**: (5,4); **Subject 10**: (1,0)

Do subjects exhibit differences in emotionality with respect to the two categories of wotds?