

Homework 13

How difficult is it to maintain your balance while concentrating? It is more difficult when you are older? Nine elderly people and eight young people were subjects in an experiment. Each subject stood barefoot on a “force platform” and was asked to maintain a stable upright position and to react as quickly as possible to an unpredictable noise by pressing a hand held button. The noise came randomly and the subject concentrated on reacting as quickly as possible. The platform automatically measured how much each subject swayed in millimetres in both the front-to-back and the side-to-side directions. Answer the following questions about the provided data. Assume the populations are normally distributed.

1. The data collected for each subject’s side-to-side swaying (mm) is given below. The researchers claim that the population standard deviation for the side-to-side swaying is less than 8.6 mm. Conduct a hypothesis test with $\alpha = 0.01$.

| | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 14 | 41 | 18 | 11 | 16 | 24 | 18 | 21 | 37 | 17 | 10 | 16 | 22 | 12 | 14 | 12 | 18 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

2. Below you will find the data collected for each subject’s front-to-back swaying (mm). The researchers claim that the mean front-to-back swaying is 22.5 mm. Conduct a hypothesis test with $\alpha = 0.05$.

| | | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 19 | 30 | 20 | 19 | 29 | 25 | 21 | 24 | 50 | 25 | 21 | 17 | 15 | 14 | 14 | 22 | 17 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

3. The data for front-to-back swaying for the young cohort and elderly cohort is given below. Is it true that the mean elderly level for front-to-back swaying is greater than mean young level for front-to-back swaying? Conduct a hypothesis test with $\alpha = 0.01$. Assume the population variances are not equal.

| | | | | | | | | | |
|---------|----|----|----|----|----|----|----|----|----|
| Elderly | 19 | 30 | 20 | 19 | 29 | 25 | 21 | 24 | 50 |
| Young | 25 | 21 | 17 | 15 | 14 | 14 | 22 | 17 | |