1. It is suspected that high pollution levels (measuredby number of particulates found in the air) increase the levels of asthmaattacks. A researcher collects data on50 people who experienced an asthma attack during the course of one year. For each person the number of particulateswas recorded for the day of the attack (day of attack) and for a day exactlyone month before the day of the attack (control). The results are as follows:

|  |  |
| --- | --- |
|   | Number of attacks. |
| Pollution day of attack > pollution on control day | 30 |
| Pollution day of attack < pollution on control day | 15 |
| Pollution day of attack = pollution on control day | 5 |
| Total | 50 |

Assume a null hypothesis that pollution has nothingto do with having an asthma attack. Howmany attacks would you expect when the pollution level on the day of the attackis higher than the control day, ignoring the days when pollution level days areequal?

Given the data in the table, assess whetherpollution is affecting asthma attacks. (Hint: use the normal approximation to the binomial distribution).

c. Now assume a seasonal variation on the pollutionlevels. Say in the winter instead of 30we have 10, instead of 15 we have 4 and 2 cases when they are equal. Given this data does pollution affect asthma attacks?

6.   Recently a clinical trial was conducted to test theability of heart failure patients to improve the amount of time they could walkon a treadmill post a surgical intervention. 107 patients were randomly assigned to regular medical therapy and 105to the surgical intervention. Thepatients were tested at baseline and again at 6 months post surgery. The results are shown below:

|  |  |  |  |
| --- | --- | --- | --- |
|   | Mean Change in 6month-baseline (minutes) | Standard deviation | N |
| Regular medical therapy | 0.5 | 2.2 | 100 |
| Surgical procedure  | 2.1 | 3.1 | 99 |

What test would we do to test for a change in meantotal change for a specific group?

b. Report the value of this test for the medical group and report a p-value

7.   It is very hard to predict how long post-surgicaltrauma patients typically spend in the ICU (those who survive to make it to theICU). Below is typical data on thenumber of days spent in ICU for these types of patients from 2 differenthospitals

|  |  |
| --- | --- |
|   | Days in ICU.. |
| Hospital ICU A | 10, 21, 60, 32, 5, 29, 44, 8, 33, 26, 13 |
| Hospital ICU B | 76, 68, 87, 10, 86, 27, 125, 238, 96, 44, 73, 35, 60 |

Why is a t-test not a good test for this type ofdata?

b. Pick anon-parametric test that is most appropriate for determining if the number of days spent in the ICU for these two hospitals is comparable.  What is the result of this test?