Week 10 (Data Analysis Techniques)

Perform the following hypothesis tests using python libraries.

1. In a packaging plant, a machine packs cartons with jars. It is supposed that a new machine would pack faster on the average than the machine currently used. To test the hypothesis, the time it takes each machine to pack ten cartons are recorded. The result in seconds is as follows.

New Machine	Old Machine
42.1	42.7
41	43.6
41.3	43.8
41.8	43.3
42.4	42.5
42.8	43.5
43.2	43.1
42.3	41.7
41.8	44
42.7	44.1

Do the data provide sufficient evidence to conclude that, on the average, the new machine packs faster? Perform the required hypothesis test at the 5% level of significance.

2. A clinic provides a program to help their clients lose weight and asks a consumer agency to investigate the effectiveness of the program. The agency takes a sample of 15 people, weighing each person in the sample before the program begins and 3 months later.
   The results a tabulated below

Person	Before	After	Difference
1	210	197	13
2	205	195	10
3	193	191	2
4	182	174	8
5	259	236	23
6	239	226	13
7	164	157	7
8	197	196	1
9	222	201	21
10	211	196	15
11	187	181	6
12	175	164	11
13	186	181	5
14	243	229	14
15	246	231	15

Determine is the program is effective.

3. Sussan Sound predicts that students will learn most effectively with a constant background sound, as opposed to an unpredictable sound or no sound at all. She randomly divides 24 students into three groups of 8 each. All students study a passage of text for 30 minutes. Those in group 1 study with background sound at a constant volume in the background. Those in group 2 study with nose that changes volume periodically. Those in group 3 study with no sound at all. After studying, all students take a 10 point multiple choice test over the material. Their scores are tabulated below.

   Group1: Constant sound: 7,4,6,8,6,6,2,9
   Group 2: Random sound: 5,5,3,4,4,7,2,2
   Group 3: No sound at all: 2,4,7,1,2,1,5,5

4. A random sample 500 U.S adults are questioned about their political affiliation and opinion on a tax reform bill. We need to test if the political affiliation and their opinon on a tax reform bill are dependent, at 5% level of significance. The observed contingency table is given below.

	favor	**indifferent**	**opposed**	total
democrat	138	83	64	285
republican	64	67	84	215
total	202	150	148	500