ECEN321: Engineering Statistics

Assignment 10

Due: 9:00 a.m., Wednesday 17 June 2020

Hypothesis Tests

1. (Navidi 6.7.2) In a study of the relationship of the shape of a tablet to its dissolution time, 6 disc-shaped ibuprofen tablets and 8 oval-shaped tablets were dissolved in water. The dissolve times, in seconds were as follows:

   Disk: 269.0 249.3 255.2 252.7 247.0 261.6

   Oval: 268.8 260.0 273.5 253.9 278.5 289.4 261.6 280.2

   Can you conclude that the mean dissolve times differ between the two shapes?

   (Assume the dissolve times are normally distributed)

   [5 marks]

2. (Navidi 6.8.6) Two microprocessors are compared on a sample of six benchmarked codes to determine whether there is a difference in speed. The times (assumed normal, in seconds) used by each processor on each code are given in the following table.

   [4 marks]

	Code					
	1	2	3	4	5	6
Processor A	27.2	18.1	27.2	19.7	24.5	22.1
Processor B	24.1	19.3	26.8	20.1	27.6	29.8

   Can you conclude that the mean speeds of the two processors differ?

3. (Navidi 6.9.8) In an experiment to determine the effect of curing time on compressive strength of concrete blocks, two samples of 15 blocks were each prepared identically except for curing time. The blocks in one sample were cured for two days, while the blocks i the other were cured for six days. The compressive strengths of the blocks, in MPa, are as follows:

   Cured 2 days (X): 1326 1302 1314 1270 1287 1328 1318 1296 1306 1329 1255 1310 1255 1291 1280

   Cured 6 days (Y): 1387 1301 1376 1397 1399 1378 1343 1349 1321 1364 1332 1396 1372 1341 1374

   Can you conclude that the mean strength is greater for blocks cured for six days? Use the Wilcoxon rank-sum test.

   [5 marks]

4. (Navidi 6.10.4) The article "Analysis of Time Headways on Urban Roads: Case Study from Riyadh" (A. Al-Ghamdi, *Journal of Transportation Engineering,* 2001: 289–294) presents a model for the time elapsed between the arrival of consecutive vehicles on urban roads. Following are 137 arrival times (in seconds) along with the values expected from a theoretical model.

Time	Observed	Expected
0–2	18	23
2–24	28	18
4–6	14	16
6–8	7	13
8–10	11	11
10–12	11	9
12–18	10	20
18–22	8	8
>22	30	19

P.T.O.

Can you conclude that the theoretical model does not explain the observed values well?

[3 marks]