

MAT 272- STATISTICAL METHODS
ASSIGNMENT -II

To be submitted on any day between 3 March and 6 March and
before 5 PM Wednesday, 06-03-2025.

1. In a factory, 20 observations of the factors that could heat up a conveyor belt yielded the following results:
0.36, 0.41, 0.25, 0.34, 0.28, 0.26, 0.39, 0.28, 0.40, 0.26, 0.35, 0.38, 0.29, 0.42, 0.37, 0.37, 0.39, 0.32, 0.29 and 0.36. Use the sign test at the 0.01 level of significance to test the null hypothesis $\mu' = 0.34$ against the alternative hypothesis $\mu' \neq 0.34$. (Decision criterion same as for inequality in H_1)

2. The following are the data on the strength (in psi) of 2 kinds of adhesives:
Adhesive 1: 4500 4400 4110 4450 4280 4940 4450 4610 4320 4210 4250 4280 4800 4340 4480 4450 4410 4190 4250 4800
Adhesive 2: 4100 4800 4720 4620 4610 4180 4190 4250 4360 4290 4400 4310 5080 4550 4980 4780 4860 4440 4870 4990
Use the U test at the 0.01 level of significance to test the claim that the strength of Adhesive 1 is stochastically larger than the strength of Adhesive 2.

3. The following are 42 consecutive pizza breads baked by a newly improved oven model during 6 weeks: 25, 28, 32, 31, 30, 29, 16, 18, 31, 24, 72, 55, 61, 33, 30, 44, 46, 59, 62, 75, 75, 80, 70, 64, 48, 52, 39, 38, 61, 64, 38, 48, 35, 34, 49, 58, 63, 36, 75, 80, 32, and 48. Use the method of runs above and below the median and the 0.01 level of significance to test the null hypothesis of randomness against the alternative that there is a trend.

4. The following are the number of classes attended by 2 students on 20 days: 3 and 5, 1 and 2, 3 and 4, 2 and 5, 5 and 3, 4 and 2, 1 and 3, 1 and 4, 1 and 2, 2 and 4, 3 and 2, 2 and 5, 5 and 5, 1 and 3, 2 and 4, 2 and 2, 2 and 3, 3 and 5, 3 and 3, 2 and 1. Use the sign test at the 0.01 level of significance to test the null hypothesis that on average the 2 students attend equally many classes per day against the alternative hypothesis that the second student tends to attend more classes than the first.

5. Comparing two types of automobile engines, a consumer testing service obtained the following pickup (0 – 100 kmph) times (rounded to the nearest tenth of a second):

Engine A: 13.3 12.1 14 .6 8.9 9.5 12.4 13.2 13.5 13.9 12.9

Engine B: 12.6 13.1 9.8 10.4 12.5 13.6 13.0 12.2 9.9 11.5

Use the U test at the 0.05 level of significance to check whether it is reasonable to say that the population of pickup times of the two engines is identical.

6. The following are 15 measurements of the boiling point of a silicon compound (in degrees Celsius):

166 141 136 154 170 162 155 146 183 157 148 132 160 175 150

Describe the steps till the decision stage in the Kolmogorov-Smirnov test at the 0.01 level of significance to test the null hypothesis that the boiling points come from a normal population with $\mu = 160$ degrees Celsius and $\sigma = 10$ degrees Celsius
