Hypothesis Testing Practice

Z-table: https://math.arizona.edu/~rsims/ma464/standardnormaltable.pdf

T-table: https://www.sjsu.edu/faculty/gerstman/StatPrimer/t-table.pdf

Chi-Square table: https://math.arizona.edu/~jwatkins/chi-square-table.pdf

F-table: https://www.sjsu.edu/faculty/gerstman/StatPrimer/F-table.pdf

Question 1:
A company claims that its light bulbs last an average of 1,000 hours. A random sample of 40 bulbs has a mean lifespan of 980 hours. The population standard deviation is 50 hours. Test the claim at a significance level of $\alpha=0.05$.

Question 2:
A university claims that the average CGPA of its students is 3.5. A sample of 36 students shows a mean CGPA of 3.4 and the population standard deviation is 0.2. Test if the average CGPA is different from the claimed value at $\alpha=0.01$.

Question 3:
A nutritionist claims that the average calorie content of a certain type of snack is 150 calories. A sample of 25 snacks has a mean calorie content of 155 with a standard deviation of 10. Test the claim at $\alpha=0.05$.

Question 4:
A manufacturer claims that the average weight of a product is 500 grams. A sample of 16 products has a mean weight of 495 grams with a standard deviation of 8 grams. Test if the weight is significantly different from the claimed value at $\alpha=0.05$.

Question 5:
A survey was conducted to find the preferences for three brands of toothpaste: A, B, and C. The expected proportions are 40%, 35%, and 25%, respectively. Out of 200 respondents, 90 preferred brand A, 70 preferred brand B, and 40 preferred brand C. Test if the observed preferences match the expected proportions at $\alpha=0.05$.

Question 6:
A die is rolled 120 times, and the observed frequencies of each outcome (1 to 6) are as follows: [18, 22, 20, 16, 24, 20]. Test whether the die is fair at $\alpha=0.05$.

Question 7:
Three groups of students are taught using different teaching methods, and their test scores are recorded as follows:

- Group A: [78, 85, 88, 92]
- Group B: [80, 83, 87, 90]
- Group C: [75, 80, 82, 85]
  Test if there is a significant difference in the mean test scores across the groups at $\alpha=0.05$.

Question 8:
A company tests the effectiveness of three marketing campaigns by measuring the sales generated in three different regions:

- Campaign A: [120, 130, 150]
- Campaign B: [110, 125, 140]
- Campaign C: [100, 115, 135]
  Use a one-way ANOVA test to determine if there is a significant difference in the mean sales at $\alpha=0.01$.