Bonus Assessment

Problem 1 Blood clotting is due to a sequence of chemical reactions. The protein thrombin initiates blood clotting by working with another protein, prothrombin. It is common to measure an individual's blood clotting time as prothrombin time, the time between the start of the thrombin-prothrombin reaction and the formation of the clot. Researchers wanted to study the effect of aspirin on prothrombin time. They randomly selected 10 subjects and measured the prothrombin time (in seconds) without taking aspirin and 3 hours after taking two aspirin tablets. They obtained the following data:

Subject	1	2	3	4	5	6	7	8	9	10
Before Aspirin	12.3	12.0	12.0	13.0	13.0	12.5	11.3	11.8	11.5	11.0
After Aspirin	12.0	12.3	12.5	12.0	13.0	12.5	10.3	11.3	11.5	11.5

Test the claim that aspirin affects the mean time it takes for a clot to form at $\alpha = 0.05$ the level of significance.

Bonus Assessment

Problem 2 A researcher claimed that the mean weight of an NFL offensive tackle was higher than the mean weight of an NFL defensive tackle. He randomly selected 10 offensive tackles and 8 defensive tackles and obtained the following data:

Offensive Linemen	Offensive Linemen	Defensive Linemen	Defensive Linemen
323	320	289	295
295	328	250	278
305	313	305	300
308	318	310	339
309	305		

Test the researcher's claim at $\alpha = 0.05$ the level of significance.

Problem 3 The mean waiting time at the drive-through of a fast-food restaurant from the time an order is placed to the time the order is received is 84.3 seconds. A manager devises a new drive-through system that he believes will decrease wait time. To test this claim, he initiates the new system at his restaurant and measures the wait time for 10 randomly selected orders. The wait times are provided in the table. Use $\alpha = 0.10$ level of significance.

No.	1	2	3	4	5	6	7	8	9	10
Time	90.1	80.6	67.3	95.5	58.1	86.8	75.9	70.2	65.5	70.1

Bonus Assessment

Problem 4 A personal trainer is interested in comparing the anaerobic thresholds of elite athletes. Anaerobic threshold is defined as the point at which the muscles cannot get more oxygen to sustain activity or the upper limit of aerobic exercise. It is a measure also related to maximum heart rate. Is there a difference in anaerobic thresholds among the different groups of elite athletes? The following data are anaerobic thresholds for distance runners, distance cyclists, distance swimmers and cross-country skiers.

Distance Runners	Distance Cyclists	Distance Swimmers	Cross-Country Skiers
185	190	166	201
179	209	159	195
192	182	170	180
165	178	183	187
174	181	160	215

Bonus Assessment

Problem 5 A pediatrician wants to determine the relation that may exist between a childs height and head circumference. She randomly selects eleven 3-year old children from her practice, measures their heights and head circumference, and obtains the data shown in the table below.

Height (inches)	27.75	24.50	25.50	26.00	25.00	27.75
	26.50	27.00	26.75	26.75	27.50	
Head Circumference (inches)	17.5	17.1	17.1	17.3	16.9	17.6
	17.3	17.5	17.3	17.5	17.5	

Bonus Assessment

For each problem, identify the following:

1. State the null and alternative hypothesis. [2 points]
2. Determine the appropriate test to use. [1 point]
3. Determine the p-value of the test statistic. [1 point]
4. Make a statistical decision. [1 point]
5. State the conclusion based on the statistical decision and the claim the researcher wanted to verify. [2 points]

Verifying the assumptions: [1 point for each p-value and 1 point for the interpretation.]

▶ In testing the normality of data, use Shapiro Wilk Test. Determine the p-value and interpret the result.

▶ In testing the homogeneity of variances, use Levene's Test. Determine the p-value and interpret the result.