Due Wednesday, August 3, 2022 (11:59 pm)

***Problem 1*:** In a comparison of the effectiveness of distance learning with traditional classroom instruction, 12 students took a business administration course online, while 14 students took it in a classroom. The final scores were as follows.

Online	64 66 74 69 75 72 77 83 77 91 85 88
Classroom	80 77 74 64 71 80 68 85 83 59 55 75 81 81

Can you conclude that the mean score differs between the two types of course?

(Wilcoxon)

H_0: online = classroom
H_1: online ≠ classroom (i.e means are differ)

Online	Classroom		Value	Rank	New Rank	Sample	Sum of Online
64	55		55	1	1	Y	173.5
66	59		59	2	2	Y	
69	64		64	3	3.5	Y	
72	68		64	4	3.5	X	
74	71		66	5	5	X	
75	74		68	6	6	Y	
77	75		69	7	7	X	
77	77		71	8	8	Y	
83	80		72	9	9	X	
85	80		74	10	10.5	Y	
88	81		74	11	10.5	X	
91	81		75	12	12.5	Y	
	83		75	13	12.5	X	
	85		77	14	15	X	
			77	15	15	X	
12	14		77	16	15	Y	
			80	17	17.5	Y	
			80	18	17.5	Y	
			81	19	19.5	Y	
			81	20	19.5	Y	
			83	21	21.5	Y	
			83	22	21.5	X	
			85	23	23.5	Y	
			85	24	23.5	X	
			88	25	25	X	
			91	26	26	X	

Z = W – m(m+n+1)/2 / sq(mn(m+n+1)/12) = 173.5-162/3sq(42) = 0.591 ->0.7224
Would be 1 – z value but since we're doing ±z value we can just multiply by 2 the negative z score value
Both sides = 0.555 (p-value)
P-value is the probability the null hyp is true, lower it is the more different.

P value > 0.05. This means we cannot conclude that the mean scores differ. (i.e H_0 plausible)

***Problem 2*:** Scores on the math SAT are normally distributed. A sample of 20 SAT scores had standard deviation of 87. Someone says that the scoring system for the SAT is designed so that the population standard deviation will be σ = 100. Do these data provide sufficient evidence to contradict this claim?

(6.11 chi-square)
H_0: population deviation = 100
H_1: population deviation ≠ 100

Sample: 20
Deviation: 87

(n-1)s^2/sigma^2 = (20-1)(87^2)/100^2 = 14.3811
Df = 19 at 0.05 significance = 30.144

30.144 > 14.3811 the critical value is greater than our test statistic so the null hypothesis is plausible at significance level of 0.05. Therefore, there is not enough evidence to suggest that the population deviation won't be equal to 100.

***Problem 3*:** A vendor claims that no more than 10% of the parts she supplies are defective. Let p denote the actual proportion of parts that are defective. A test is made of the hypotheses H_0: $p \leq 10$ versus H_1: $p > 10$. For each of the following situations, determine whether the decision was correct, a type I error occurred, or a type II error occurred.

a. The claim is true, and H_0 is rejected. **Type I**
    a. If the claim is true then we shouldn't reject H_0 bc we test against H_1 for the plausibility of null

b. The claim is false, and H_0 is rejected. **Correct**
    a. False claim means we do reject

c. The claim is true, and H_0 is not rejected. **Correct**
    a. True claim means its plausible

d. The claim is false, and H_0 is not rejected. **Type II**
    a. False claim means we reject null

Type I: reject H_0 when its actually true
Type II: Plausible H_0 when you should reject