Business Analytics Yue Summer 2026

Assignment #2, Due 7/13/2026 or 7/14/2026

1. A professor believes that the final examination scores in statistics are normally distributed. A sample of 40 final scores has been taken, shown as below.

77	48	58	80	81	81	64	56	88	81	73	54	68	67
76	81	66	65	63	63	86	80	77	85	70	72	82	75
80	61	69	89	93	62	78	59	50	66	67	80		

   (a) State the null and alternative hypotheses.
   (b) Compute the test statistic for the goodness of fit test.
   (c) The hypothesis is to be tested at the 5% level. What is the critical value from the table for the test?
   (d) What do you conclude about the distribution of final examination scores?

2. We can use the following steps to test if random numbers follow a uniform distribution, using the chi-square goodness-of-fit test.
   Step 1. Using Minitab/Excel to generate 200 random numbers from U(0,1).
   Step 2. Separate these into 5 equal spaced intervals: (0, 0.2), (0.2, 0.4), (0.4, 0.6), (0.6, 0.8), and (0.8, 1). Count the numbers of observations in each interval.
   Step 3. The expected numbers of observations in each interval should be 40. Then, apply the chi-square test $\chi^2 = \sum_{i=1}^{5} \frac{(O_i - 40)^2}{40}$ and see if is greater than $\chi^2_{0.05}(4)$.
   Continue these steps 5 times and see how many times you reject these numbers are from U(0,1). (Note: You can separate (0,1) into other numbers of equal spaced intervals and the testing procedure shall be similar.)

3. Starting positions for business and engineering graduates are classified by industry as shown in the following table.

	Industry			
Degree Major	Oil	Chemical	Electrical	Computer
Business	30	15	15	40
Engineering	30	30	20	20

   Use α=0.01 and test for independence of degree major and industry type.

4. Allied Corporation wants to increase the productivity of its line workers. Four different programs have been suggested to help increase productivity. Twenty employees, making up a sample, have been randomly assigned to one of the four programs and their output for a day's work has been recorded. You are given the results below.

Program A	Program B	Program C	Program D
150	150	185	175
130	120	220	150
120	135	190	120
180	160	180	130
145	110	175	175

(a) State the null and alternative hypotheses.

(b) Construct an ANOVA table.

(c) As the statistical consultant to Allied, what would you advise them? Use a .05 level of significance.

(d) Use Fisher's LSD procedure and determine which population mean (if any) is different from the others. Let $\alpha = .05$.

5. A process for the manufacture of penicillin was being investigated, and yield was the response of primary interest. There were 4 variants of the basic process to be studied, denoted as treatment A, B, C, and D. It was known that an important raw material, corn steep liquor, was quite variable. Fortunately blends sufficient for four runs could be made, thus applying the opportunity to run all 4 treatments with each of 5 blocks.

Block	Treatment			
	A	B	C	D
1	89	88	97	94
2	84	77	92	79
3	81	87	87	85
4	87	92	89	84
5	79	81	80	88
average	84	85	89	86

Perform the ANOVA on this randomized block design, given that SSBL=264. (Note: You can use the formula SST=SSTR+SSBL+SSE.)

(a) State the null and the alternative hypotheses.

(b) Determine the test statistic.

(c) Use Fisher's LSD procedure and determine which population mean (if any) is different from the others. Let $\alpha = .05$.