1.(1 pt) A multinomial experiment with $k = 3$ cells and $n = 280$ produced the data shown below.

	Cell 1	Cell 2	Cell 3
n_i	80	74	126

If the null hypothesis is $H_0 : p_1 = .25,\ p_2 = .25,\ p_3 = .5$ and using $\alpha = 0.01$, then do the following:
(a) Find the expected value of Cell 1.
E(Cell 1) = _____
(b) Find the expected value of Cell 2.
E(Cell 2) = _____
(c) Find the expected value of Cell 3.
E(Cell 3) = _____
(d) Find the test statistic.
χ^2 = _____
(e) Find the rejection region.
$\chi^2 >$ _____
The final conclustion is

- A. There is not sufficient evidence to reject the null hypothesis that $p_1 = .25,\ p_2 = .25,\ p_3 = .5$.
- B. We can reject the null hypothesis that $p_1 = .25,\ p_2 = .25,\ p_3 = .5$ and accept that at least one of the multinomial probabilities does not equal its hypothesized value.

2.(1 pt) A computer random number generator was used to generate 1000 random digits (0,1,...,9). The observed frequences of the digits are given in the table below.

0	1	2	3	4	5	6	7	8	9
85	102	105	94	91	104	100	107	97	115

Test the claim that all the outcomes are equally likely using the significance level $\alpha = 0.05$.
The expected frequency of each outcome is E = _____
The test statistic is χ^2 = _____
The critical value is χ^2 = _____
Is there sufficient evidence to warrant the rejection of the claim that all the outcomes are equally likely?

- A. Yes
- B. No

3.(1 pt) It has been suggusted that the highest priority of retirees is travel. Thus, a study was conducted to investigate the differences in the length of stay of a trip for pre and postretirees. A sample of 690 travelers were asked how long they stayed on a typical trip. The observed results of the study are found below.

Number of Nights	Pre-retirement	Post-retirement	Total
4 – 7	242	166	408
8 – 13	81	67	148
14 – 21	34	52	86
22 or more	13	35	48
Total	370	320	690

With this information, construct a table of estimated expected values.

Number of Nights	Pre-retirement	Post-retirement
4 – 7	_____	_____
8 – 13	_____	_____
14 – 21	_____	_____
22 or more	_____	_____

Now, with that information, determine whether the length of stay is independent of retirement using $\alpha = 0.01$
χ^2 = _____
rejection region is $\chi^2 >$ _____
The final conclustion is

- A. We can reject the null hypothesis that the length of stay is independent of retirement and accept the alternative hypothesis that the two are dependent.
- B. There is not sufficient evidence to reject the null hypothesis that the length of stay is independent of retirement.

4.(1 pt) Among drivers who have had a car crash in the last year, 180 were randomly selected and categorized by age, with the results listed in the table below.

Age	Under 25	25-44	45-64	Over 64
Drivers	72	43	27	38

If all ages have the same crash rate, we would expect (because of the age distribution of licensed drivers) the given categories to have 16%, 44%, 27%, 13% of the subjects, respectively. At the 0.05 significance level, test the claim that the distribution of crashes conforms to the distribution of ages.
The test statistic is χ^2 = _____
The critical value is χ^2 = _____
The conclusion is

- A. There is sufficient evidence to warrant the rejection of the claim that the distribution of crashes conforms to the distibuion of ages.
- B. There is not sufficient evidence to warrant the rejection of the claim that the distribution of crashes conforms to the distibuion of ages.

5.(1 pt) Test the null hypothesis of independence of the two classifications, A and B, of the 3×3 contingency table shown below. Test using $\alpha = 0.05$

	B_1	B_2	B_3	Total
A_1	49	64	62	175
A_2	45	80	66	191
A_3	76	79	45	200
Total	170	223	173	566

χ^2 = _____
rejection region is $\chi^2 >$ _____
The final conclustion is

- A. There is not sufficient evidence to reject the null hypothesis that A and B are independent.
- B. We can reject the null hypothesis that A and B are independent and accept that A and B are dependent.

6.(1 pt) The number of men and women among professors in Math, Physics, Chemistry, Linguistics, and English departments of a certain college were counted, and the results are shown in the table below.

Dept.	Math	Physics	Chemistry	Linguistics	English
Men	39	85	37	26	27
Women	2	5	2	4	17

Test the claim that the gender of a professor is independent of the department. Use the significance level $\alpha = 0.01$

The test statistic is $\chi^2 =$ _____

The critical value is $\chi^2 =$ _____

Is there sufficient evidence to warrant the rejection of the claim that the gender of a professor is independent of the department?

- A. Yes
- B. No