

Assignment 7: Due Nov 11, 2019

**** Please print your assignment and submit it to the lecturer on the due date, thanks for your cooperation.**

1. The mitral valve is the heart valve between the left atrium and left ventricle and it has two flaps. In patients with mitral valve prolapse, one or both valve flaps are enlarged. When the heart pumps(contracts), part of one or both flaps collapse backward into the left atrium permitting a small amount of blood to leak backward through the valve and cause a heart murmur. Patients with mitral valve prolapse are at higher risk for infection during dental procedures. Consequently, a single large dose of an antibiotic is usually prescribed for such patients to be taken one hour before any dental work is done. In a pilot study of antibiotics, penicillin was administered to six volunteers and in a later trial the same dose of amoxicillin was given to the same people. The table below give the concentration of each drug in the bloodstream 1 hour after administration. The measurements are in $\mu\text{g/ml}$ and are summed to be normally distributed. Is the bloodstream concentration of penicillin significantly different from that of amoxicillin?

Person	Penicillin	Amoxicillin
1	42	36
2	34	44
3	57	61
4	40	35
5	28	35
6	48	50

2. Using the following data, and assuming that both populations are normal with equal variance, test the null hypothesis that male and female turtles have the same mean serum cholesterol concentrations.

<i>Serum cholesterol (mg/100 ml) of turtles</i>	
Male	248,329,223,313,271,324,255,255,423,332,311,264
Female	341,311,362,371,419,366,246,273,312,331

3. The following data were reported in the study “A Low Carbohydrate as Compared with a Low Fat Diet in Severe Obesity”. 132 severely obese subjects randomized to one of two diet groups. Subjects followed for a six-month period. Assuming that both populations are normal with equal variance, test the null hypothesis that the mean weight changes in two diet groups are same. Redo this problem with unequal variance.

	Diet Group	
	Low-Carb	Low-Fat
Number of subjects (n)	64	68
Mean weight change (kg) Post-diet less pre-diet	-5.7	-1.8
Standard deviation of weight changes (kg)	8.6	3.9

4. A group of investigators are studying a treatment that can reduce LDL Cholesterol level. The following data shows the reduction of LDL at the end of the observation period from the treatment and control sample of participants, which were randomly selected from a specific patient population.

Data (Reduction in LDL):

Treatment: 80, 73, 34, 88, 95, 61, 110, 85

Control: 30, 59, 72, 63, 47, 70, 58, 61

Suppose the data is approximately normal distributed. Perform a t-test to test whether the average reduction in LDL in the treatment is greater than that in the control, at 5% level of significance.

5. There two types of experimental design are used for gene expression comparisons between tumor and normal tissues, which are tumor vs. tumor adjacent normal (paired) or tumor vs. normal from non-tumor people (un-paired). Give your comments about pros and cons of these two types of design.