Assignment 8

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Exercise 1

Creatine phosphokinase (CPK) is a skeletal muscle isoenzyme that is often found to be elevated in the serum of acutely psychotic subjects during the initial stages of a psychotic episode. A number of variables known to affect serum CPK activity have been evaluated as possible causes of the serum CPK activity elevations observed during acute psychotic episodes. One such variable of interest is that of physical exercise, which is well known to increase serum CPK levels in normal subjects.

In this regard, Goode and Meltzer (1976) studied the relationship between isometric exercises (designed to strengthen and tone muscle without lengthening and contracting the muscles themselves) and increased CPK levels in psychotic patients. In particular, they were interested in whether the elevation of CPK in the serum of psychiatric patients may be in part due to increased covert isometric motor activity.

The subjects in their study were patients hospitalized on a research unit at the Illinois Psychiatric Institute. Fourteen such patients were isometrically exercised following remission of psychotic symptoms, usually 2-4 weeks after admission. The 60-min isometric exercise procedure involved stationary wall bars and required maximal use of all major muscle groups. The subjects described the exercises as extremely fatiguing and at or near the limits of their endurances.

Table contains the plasma CPK activity (mU/l) levels for each of these 10 patients prior to the period of isometric exercises, as well as at 18 and 42 h after completion of such exercises.

Subject	Preexercise	19 h postexercise	42 h postexercise
1	27	101	82
2	30	112	50
3	24	26	68
4	54	89	135
5	21	30	49
6	36	41	48
7	36	29	46
8	16	20	8
9	21	26	25
10	26	25	31

(1) To assess whether there are any differences in CPK activity between the three patient conditions. Propose a test procedure, specify hypotheses, use the large-sample approximation to conduct the test (first do it without the R built-in function, then double check your solution using the built-in function), and make a conclusion.

(2) After conducting the above test, based on the result, is there a need to do further analysis? If so, what test can be done; if not, why. If yes, conduct the test proposed, and make sure to specify the hypotheses.

Exercise 2

In a study to determine the effect of light on the release of luteinizing hormone (LH), Rice (1988) compared data for male and female rats kept in constant light with similar animals exposed to a regime of 14 h of light and 10 h of darkness. Five different dosages of a luteinizing release factor (LRF) were considered in the study and the measurement obtained from the animals was the level of LH (in nanograms per milliliter of serum) in blood samples collected after exposure to one of the regimes in combination with one of the LRF dosages.

Sixty male rats were randomly allocated to the various experimental settings in such a way that six rats were exposed to each of the 10 combinations of light regime and LRH dosage.

	Light regime					
LRF dosage	Constant light			14 h light/10 h dark		
0ng (control)	72	64	78	212	27	68
	20	56	70	72	130	153
10ng	74	82	40	32	98	148
	87	78	88	186	203	188
50ng	130	187	133	294	306	234
	185	107	98	219	281	288
250ng	159	167	193	515	340	348
	196	174	250	205	505	432
1250ng	137	426	178	296	545	630
	208	196	251	418	396	227

(1) Use the Mack-Skillings test, to test the hypothesis that degree of exposure to light has an effect on serum levels of LH across the LRH dosages included in the study. Use the large-sample approximation to conduct the test, (first do it without the R built-in function, then double check your solution using the built-in function), and make a conclusion.

(2) After conducting the above test, based on the result, is there a need to do further analysis? If so, what test can be done; if not, why. If yes, conduct the test proposed, and make sure to specify the hypotheses.