Homework 7 (Unit 7)

Question 1:

다음 표는 쌍둥이 연구에서 나온 것입니다. 연구자들은 파킨슨병을 각자 다른 발병 상황을 갖는 쌍둥이 사이에 이전의 화학 물질 노출을 비교했다.

The following table comes from a twin study. Researchers compared previous chemical exposures between twins who were discordant for Parkinson's disease (one twin had Parkinson's disease but the other did not). (Reproduced with permission from: Goldman SM, et al. Solvent exposures and parkinson disease risk in twins. Ann Neurol 2012; 71: 776-784; the table has been simplified from the original for this assignment).

Table 3. Solvent Exposure Frequencies in Parkinson's-Discordant Twins, n=99 Pairs.

Solvent	$Case^-/Control^-$	$Case^+/Control^-$	$Case^-/Control^+$	$Case^+/Control^+$
Toluene	72	11	9	7
Xylene	88	6	2	3
n-Hexane	85	6	7	1
CCl_4	74	14	9	2
PERC	93	5	1	0
TCE	87	9	2	1

What is the appropriate statistical test for analyzing these data?

이 데이터를 분석하기 위한 적절한 통계적 검사는?

1. Difference in proportions Z-test
2. Chi-square test
3. Fisher's exact test
4. McNemar's exact test
5. ANOVA
6. paired ttest

Question 2:

Use the test you picked in question 1 to analyze the data on exposure to PERC alone (fifth row of data in the above table). Calculate a two-sided p-value for the null hypothesis that PERC exposure is equivalent between Parkinson's cases and controls. Enter the resulting two-sided p-value rounded to 2 decimal places:

Question 3:

The following table shows the effects of smoking on blood pressure and heart rate in a sample of 100 women. Assume that blood pressure and heart rate are reasonably normally distributed.

Effects of smoking on blood pressure and heart rate (mean ± 1 standard deviation)

	Before Smoking	After smoking
Systolic pressure (mm/Hg)	108.6±12.6	110.0±12.4
Heart rate (bpm)	90.0±10.9	93.8±11.0

What is the appropriate statistical test for analyzing these data?

1. Difference in proportions Z-test
2. Chi-square test
3. Fisher's exact test
4. McNemar's exact test
5. ANOVA
6. paired ttest

Question 4:

TRUE or FALSE. The data given in the table are sufficient to be able to apply the statistical test that you selected in question 3.

1. True
2. False

Question 5:

The following data were collected to examine possible associations between being breast-fed as an infant and being overweight or obese as an adult. Researchers asked 1486 mothers of 18-year old men about the total duration that they had breast-fed their sons and then took weight and height measurements of the sons. (Extracted with permission from: Victora CG et al. Anthropometry and body composition of 18 year old men according to duration of breast feeding: birth cohort study from Brazil. BMJ 2003; 327: 901, Table 3.)

Table 3. Anthropometry and body composition of 18-year old men according to total duration of breast-feeding. Values are number (percent) and means (SDs).

	Duration of total breast feeding (months)			
Outcomes	**<1**	**1-6**	**6-12**	**>=12**
Number overweight (%)	69 (14.1)	130 (24.7)	50 (33.3)	44 (13.7)
Number obese (%)	47 (9.6)	69 (13.1)	31 (20.7)	27 (8.4)
BMI, kg/m^2 (SD)	22.5 (3.8)	22.7 (3.6)	22.9 (3.2)	23.0 (3.5)
Total Number of Participants	489	526	150	321

Which statistical test would you use to determine whether or not breast-feeding duration is related to overweight at 18?

1. Difference in proportions Z-test
2. Chi-square test
3. Fisher's exact test

4. McNemar's exact test
5. ANOVA
6. paired ttest

Question 6:

Which statistical test would you use to determine whether or not breast-feeding duration is related to BMI at 18?

1. Difference in proportions Z-test
2. Chi-square test
3. Fisher's exact test
4. McNemar's exact test
5. ANOVA
6. paired ttest

Question 7:

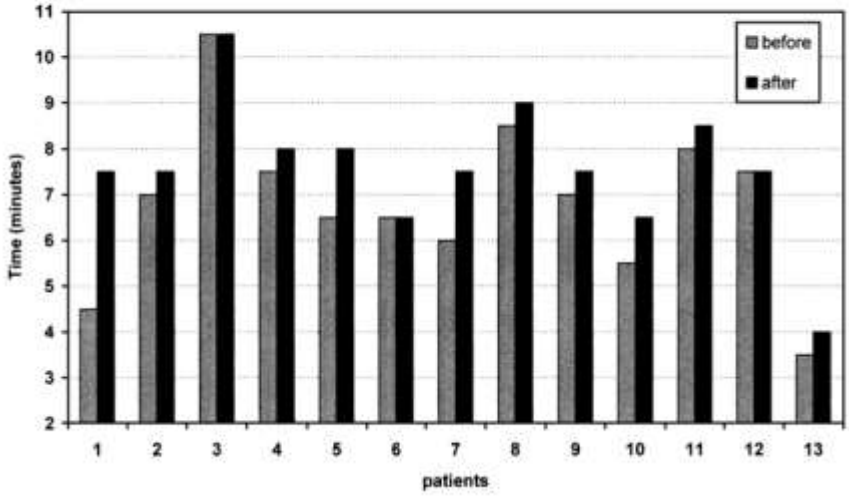
The p-value associated with obesity is statistically significant. This tells us that:

1. Significantly fewer highly breastfed babies are obese.
2. The percent obese decreases significantly across the breastfeeding categories.
3. Breastfeeding babies for at least one year is linked to less obesity.
4. The percent of obese subjects differs in at least one of the breastfeeding categories.

Question 8:

The following figure is from a study of exercise endurance (duration on an exercise test) in a group of 13 children with cystic fibrosis before and after an intervention program (a 4-week summer camp). For example, subject 1 improved by 3 minutes. (Reproduced with permission from: Blau H, et al. Effects of an Intensive 4-Week Summer Camp on Cystic Fibrosis: Pulmonary Function, Exercise Tolerance, and Nutrition. Chest. 2002;121:1117-1122.)

Figure 3. Exercise endurance (duration) before and after camp.



Using your best estimate of values from the graph, calculate the mean change in exercise duration for the 13 patients and enter it rounded to 2 decimal places.

Question 9:

Calculate the standard deviation of change in duration for the 13 patients and enter it rounded to two decimal places.

Question 10:

Calculate the standard error for the mean change in duration and enter it rounded to two decimal places. Recall that the standard error of a mean is the standard deviation divided by the square root of n.

Question 11:

Give the 99% confidence interval for the estimated increase in test duration. The T-value for a 99% confidence interval with 12 degrees of freedom is: 3.055. Please round both of your answers to two decimal places.

The lower confidence bound is:

The upper confidence bound is:

Question 12:

TRUE or FALSE. The improvement in exercise duration is significant at the 0.01 level.

1. True
2. False

Question 13:

TRUE or FALSE. These data provide conclusive evidence that the summer camp is effective at improving exercise duration in children with cystic fibrosis.

1. True
2. False