HW8 – Chapter 23 ***Name*** _____

The heart pulse rate at rest is a good indicator of how fit you are. Ten Rutgers students volunteered to test a new exercise machine in Werblin gym by using it for 20 minutes three times. Their heart pulse rates at rest (beats per minute) were measured before the study began, and then after a period of six weeks. Results are shown below. Does this type of exercise reduce the heart pulse rate at rest? If so, how much?

	Pulse rates (beats/min)	
Subject	**Before**	**After**
Allen	73	73
Brandon	83	79
Carlos	85	81
David	87	86
Edwin	91	87
Franco	99	91
Graeme	87	84
Hans	85	83
Ivan	83	84
Jorge	79	76

1.How many samples do we have?
A. 1 B. 2 C. 10 D. 20

2.Are the samples independent?
A. Yes B. No, and the pairs are not either C. Impossible to determine D. No, but the pairs are independent

3.Which test should I use?
A. a two samples t-test B. a one sample t-test C. a two-sample z-test for proportions D. a paired t-test

4.What's my null hypothesis in words?
A. there is a difference in pulse rates before and after the exercise program, but it is not significant
B. there is a significant decrease in pulse rates before and after the exercise program
C. there is no difference in pulse rates before and after the exercise program
D. The pulse rate before and after the program is significantly different from zero

5.What's my alternative hypothesis in words?
A. there is a difference in pulse rates before and after the exercise program, but it is not significant
B. there is a significant decrease in pulse rates before and after the exercise program
C. there is no difference in pulse rates before and after the exercise program
D. The pulse rate before and after the program is significantly different from zero

6.What are my hypotheses in mathematical terms?
A. $H_0 : m_d = 0$ $H_A : m_d > 0$
B. $H_0 : m_d = 0$ $H_A : m_d \neq 0$
C. $H_0 : m_d = 0$ $H_A : m_d < 0$
D. $H_0 : m_d \neq 0$ $H_A : m_d < 0$

7.How many degrees of freedom do we have?
A. 9 B.10 C. 20 D. 1

8.What's the mean difference between the pairs?
A. -4.5 B. -0.23 C. 2.34 D. -2.8

9.What's the sample standard deviation ? (the standard deviation of the difference between the pairs) *feel free to use the computer to calculate it*
A. 2.17 B. 2.53 C. 5.67 D. 3.45

10.What's the standard error of the sampling distribution of the difference between the pairs?
A. 2.576 B. 0.800 C. 0.345 D. 1.265

11.What's the value of t?
A. 3.5 B. 2.45 C. -3.5 D. -2.45

12.How do you express the p-value in terms of a probability? (hint: draw the normal model and think about the meaning of the word "extreme").
A. The probability that a value as extreme or more extreme than the t statistics we found belongs to the sampling distribution of the pairwise differences
B. The probability that a value as extreme or less extreme than the t statistics we found belongs to the sampling distribution of the pairwise differences
C. The probability that a value as extreme or more extreme than the t statistics we found does not belong to the sampling distribution of the pairwise differences
D. The probability that a value as extreme or less extreme than the t statistics we found does not belong to the sampling distribution of the pairwise differences

13.How do you express the p-value in mathematical terms? (X stays for the value of the t statistics we found)
A. $P = P(t_9 = X)$
B. $P = P(t_9 \neq X)$
C. $P = P(t_9 < X)$
D. $P = P(t_9 > X)$

14.Without looking at a table, how big do you expect the p-value to be, given this value of t?

A. very big
B. big
C. small
D. very small

15.What's the approximate value of the p-value from the t table?
A. p-value < 0.005
B. 0.01 < p-value < 0.005
C. 0.025 < p-value < 0.01
D. 0.05 < p-value < 0.025

16.What are your conclusions?
A. there is a significant decrease in pulse rate after the exercise regimen
B. there is a significant increase in pulse rate after the exercise regimen
C. there is not a significant decrease in pulse rate after the exercise regimen
D. there is a not significant increase in pulse rate after the exercise regimen

Chapter 24

Students in a large lecture course were asked if they had eaten breakfast or not before class. The results are expressed in the following table:

		Breakfast		
		Yes	No	Total
Sex	Male	66	66	132
	Female	125	74	199
	Total	191	140	331

Is the fact of eating or not eating breakfast linked to the students' gender? Use a statistical test to find out.

17.Which test can you use?
A. a chi-square test of goodness of it
B. a two-samples t-test
C. a chi-square test of independence
D. a chi-square test of homogeneity

18.What's the null hypothesis in words?
A. Students' gender and eating breakfast are independent.
B. Students' gender and eating breakfast are not independent.
C. Students' gender and eating breakfast are paired
D. Students' gender and eating breakfast are categorical variables.

19.What's the alternative hypothesis in words?

A. Students' gender and eating breakfast are independent.
B. Students' gender and eating breakfast are not independent.
C. Students' gender and eating breakfast are paired
D. Students' gender and eating breakfast are categorical variables.

20.Of three conditions, counted data, randomization, and expected cell frequency, which are satisfied?
A. all three B. only the first one C. the first one and third one D. only the third one

21.How many degrees of freedom?
A. 2 B. 1 C. 4 D. 6

22.What are the expected values for males in the two conditions?
A. 45.23 and 84.169 B. 76.17 and 84.169 C. 114.83 and 55.83 D. 76.17 and 55.83

23.What are the expected values for females in the two conditions?
A. 45.23 and 114.83 B. 114.83 and 84.169 C. 109.67 and 84.169 D. 45.23 and 67.234

24.What's the value of the chi-square statistics? (3 points) *show your work*
A. 5.339 B. 2.675 C. 6.785 D. 1.657

25.What the meaning of the p-value in words?
A. What's the probability that a value as extreme or more extreme than the chi-square statistics we found belongs to a chi-square distribution with the df we calculated?
B. What's the probability that a value as extreme or less extreme than the chi-square statistics we found belongs to a chi-square distribution with the df we calculated?
C. What's the probability that a value as extreme or more extreme than the chi-square statistics we found does not belong to a chi-square distribution with the df we calculated?
D. What's the probability that a value as extreme or less extreme than the chi-square statistics we found does not belong to a chi-square distribution with the df we calculated?

26.What's the approximate value of the p-value from the table?
A. between 0.1 and 0.05 B. greater than 0.1 C. between 0.025 and 0.01 D. between 0.05 and 0.025

27. What are my conclusions?
A. eating breakfast and gender are not independent
B. eating breakfast and gender are independent
C. eating breakfast and gender are paired
D. the result is inconclusive