Name:_____

Instructions (Please read these completely before you begin your work and let me know if you have questions.)

This homework assignment requires you to provide two types of responses, calculations and narratives.

- For calculations, you must handwrite and show your work. You may used additional paper to show your work, but you must scan these pages into the final pdf for submission. You will then enter your final response into the

Showing Your Work

To clarify what this means, I will give you an example. If I asked you to calculate the mean for the numbers below, you must show your work as demonstrated, even though you may use a calculator for the actual calculations.
Problem: Calculate the mean for these numbers: 10 15 20 25 30

$$\bar{x} = 10 + 15 + 20 + 25 + 30 = \frac{100}{5} = 20$$

Failure to show your work will result in a grade of 0 for the entire assignment.

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Part 1. For the following narratives, use your own words. For each of the following scenarios, design an appropriate study using the study designs from chapters 4, 7 & 8. Explain and justify the study design chosen. In your justification, include a discussion of the research question(s) or aim(s), the setting, and resources available, such as time, personnel, and funding. In addition, discuss the appropriate statistical measures for the study design and potential sources of bias.

1. A small country with a population of approximately 10 million people is attempting to predict the healthcare resources required to handle chronic conditions typically found in adults 18 years of age and older. The goal is to ascertain the prevalence of major chronic conditions and the risk behaviors among all adults, including heart disease, stroke, hypertension, diabetes, dyslipidemia, current cigarette use, physical activity level, and nutrition status. The research team has a staff of two epidemiologists, two data analysts, and 20 other personnel with a variety of skills. The leader of the research team has been asked to complete the study in two years and stay within an operating budget of $2 million.

2. A group of researchers has been asked to determine the effectiveness of a new vaccine for preventing pneumonia in the elderly population (aged 65 and older). The goal is to ascertain whether the new vaccine significantly reduces the incidence of pneumonia among those in the study population compared to the vaccine currently used. The research team has a staff of two epidemiologists, two large fully staffed health maintenance organizations, and 10 other personnel with a variety of skills. The leader of the research team has been asked to complete the study in one year and stay within an operating budget of $7.5 million.

3. The Governor of Florida has been contacted by a concerned citizen regarding the possible connection between exposure to pesticides and amyotrophic lateral sclerosis, a rare neurological condition, in a community in Broward County. The Governor has assembled a multidisciplinary team from several state and local agencies and charged the team with assessing whether there is an association between amyotrophic lateral sclerosis and potential pesticide exposure among those living in three neighborhoods built on land formally occupied by citrus groves. The Governor has set a deadline of six months to complete the study and limited the operating budget to $100,000.

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Part 2. For each of the scenarios, provide the information requested. <u>You must show your work</u>. The number of decimal places required appears in brackets. For example, [2] requires you to use 2 decimal places to express your final response.

Scenario 1. The table below shows data from a 10-year cohort study of adults who, at baseline, did not have hyperinsulinemia. The dependent variable (outcome) is hyperinsulinemia status, and the independent variable (exposure) is sex. Calculate the measures listed below the table. Hint: For items 4-11, do not use person-time.

		Dependent Variable		
		Hyperinsulinemia	No Hyperinsulinemia	Person-Years
Independent Variable	Male	108	174	20,000
	Female	75	177	24,000

4. Calculate the appropriate measure to quantify the cumulative risk of hyperinsulinemia among males [4].

5. Calculate the appropriate measure to quantify the cumulative risk of hyperinsulinemia among females [4].

6. Calculate the appropriate measure to quantify the cumulative risk of hyperinsulinemia among all study participants [4].

7. Calculate the appropriate measure to quantify the excess risk of hyperinsulinemia among males attributed to being male using a rate base of 1000 [2].

8. Calculate the appropriate statistic that refers to the percentage of hyperinsulinemia cases attributed to being male [2].

9. Calculate the appropriate measure to quantify the excess risk of hyperinsulinemia in the population attributable to being male using a rate base of 1000 [2].

10. Calculate the appropriate measure to quantify the percentage of those with hyperinsulinemia in the population attributed to being male [2].

11. Calculate the most appropriate measure of association to determine if being male is associated with developing hyperinsulinemia [2].

12. Calculate the rate ratio of hyperinsulinemia among males compared to females [2].

13. In your own words, write a one-sentence interpretation for at least **five** of the measures you calculated for items 4 – 12. You must quantify your responses using the numbers you calculated. Vague interpretations such as, "The risk is higher in males compared to females" will be considered incorrect. Include the item number before the sentence you write. For example, if I were writing an interpretation for item 11, I would start my interpretation with "11. The risk…".

Scenario 2. The table below shows data from a case-control study examining the relationship between being smoking cigarettes and lymphomatoid granulomatosis (LYG), a rare vascular disease. Cases were selected from patients with an autoimmune disease from a local rheumatology practice. Controls were selected from patients with an autoimmune disease who were hospitalized at a hospital near the rheumatology practice. The dependent variable (outcome) is LYG status, and the independent variable (exposure) is smoking status. Calculate the measures and answer the questions below the table.

		Dependent Variable	
		LYG	No LYG
Independent Variable	Smokers	25	575
	Nonsmokers	10	690

14. Calculate the most appropriate measure of association to determine if smoking cigarettes is associated with having LYG.

15. In your own words, write a brief description of at least three specific types and sources of bias that should be considered for the study described in Scenario 2. Write your response using details from the study described. Generalized statements that could apply to all case-control studies will be considered incorrect.

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16. Using the information from Part 2, scenario 2, Apply the six steps for evaluating whether an association between exposure and outcome variables are statistically significant using α=0.05.

Step 1:

Step 2:

Step 3:

Step 4:

Step 5:

Step 6: