Math 200

Contingency Intro   Name:_____

Show all relevant work!

① The table below is based on records compiled by the Florida State Highway Safety and Motor Vehicles Office. Are people less likely to have a fatal accident if they are wearing a seatbelt?

Injury

	Nonfatal Injury	Fatal Injury	Row Total
Seat Belt	412,368	510	412,878
No Seat Belt	162,527	1,601	164,128
Column Total	574, 895	2,111	577,006

(Seat Belt)

② Polio is a severe illness that can cause paralysis (or death) in its victims. Many people who had polio in the early part of the 1900's became paralyzed and were unable to move their legs or other limbs. The most famous polio victim was Franklin D. Roosevelt, who was the US President from 1933-1945. During the period after WWII the two greatest fears among Americans were the atomic bomb and polio.

Jonas Salk developed the first polio vaccine and in 1954 he and his team of researchers ran a randomized experiment on the effectiveness of a vaccine to prevent polio. The real vaccine was given to 200,745 children and a placebo was given to 201,229 children. The results showed that 33 of the children given the real vaccine developed polio, while 115 of the children given the fake vaccine developed polio.

Type of Vaccine

	Real	Placebo	Total
Developed Polio			
Did Not Develop Polio			
Total			

(Disease)

(a) Complete the table above.

(b) Find the probability that a child in the study developed polio. Comment on the significance of this probability.

(c) Find the probability that a child received the real vaccine and developed polio. Use probability notation, show your steps and give the answer as a decimal.

(d) What is the explanatory variable in this study?_____

   What is the response variable in this study?_____

(e) Was the vaccine effective in reducing the risk of polio? Use probability to support your conclusion.

③ The newspaper headline "Drinking Coffee Reduces the Risk of Dementia by 65%," summarizes the findings of a study described in the paper, "Caffeine as a Protective Factor in Dementia and Alzheimers Disease."
The study followed 1,409 adults for 21 years. During that time, 61 adults developed dementia. The researchers classified the research participants into three categories based on how much coffee they drank in a typical day: Low (0 to 2 cups per day), Medium (3 to 5 cups per day) and High (6 or more cups per day).
The results of the study are summarized in the table below.

	Low Coffee Consumption	Medium Coffee Consumption	High Coffee Consumption	Total
Developed Dementia	20	20	21	61
Did Not Develop Dementia	204	622	522	1348
Total	224	642	543	1409

(a) Find P(Dementia). What is the significance of this probability?

(b) Find P(Low Coffee | Dementia) =_____ and P(Medium Coffee | Dementia) =_____.
Does this mean that the risk of developing dementia is about the same for each group? Explain.

(c) What is the explanatory variable in this study?_____

What is the response variable in this study?_____

(d) Does the level of coffee consumption appear to affect the likelihood of developing dementia? Explain.

(e) Explain the assertion in the newspaper headline.