1. Which is dependent on the other, incidence or prevalence. Explain your answer. (**10 points**)

2. What are the 3 main factors used for evaluating patterns of illness in human populations? Compare and contrast features of each of these factors for the cases of illness associated with a tanker accident with a caustic toxic spill in a surrounding neighborhood versus a reported recent increase in the incidence of asthma in Boston. (**15 points**)

3. A. If a PHS for a town found that cell phone usage was significantly associated with a 2-fold increase in the risk of migraine headache, and 50% of migraines were found to be attributable to cell phone use, then what fraction of people in the town reported that they used cell phones? (**5 points**)

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Quiz 3
(Please, be sure to write your name on all pages!)
Note: Attached statistical tables and news article

B. What type of study is the least likely to have been performed? Explain your answer (**5 points**)

C. If the p-value for the study results were 0.05, what recommendations would you make to the public health department? Explain your answer (**5 points**)?

D. Independent of your recommendation, the public health department bans all cell phone sales and use. This causes a lot of civil unrest…especially at colleges. Five years later, after a lot of protests, riots, and criminal prosecutions, a second PHS shows that both the incidence and prevalence of migraines is unchanged from before the ban on cell phones. Name the type of statistical error in the first study that is most likely responsible for this outcome and give the probability of its occurrence. (**5 points**)

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E. Assuming that your choice of statistical error, in **D** above, was not responsible, provide another explanation for the outcome described in **D**. (**5 points**)

4. Which measure of test accuracy is equivalent to statistical power? (**5 points**)

5. What type of distribution is most likely to arise for data collected from the following three processes. Explain your answers. Indicate how would you confirm each type of distribution.

A. Counts of cells found in the wells of 96-well plates after dispensing 0.2 ml per well of an infinitely large, well-mixed suspension of cells at a concentration of 2 cells per 0.2 ml (**5 points**)

B. Measurements of the fasting blood glucose level of MIT undergraduates. (**5 points**)

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C. Single molecule measurements (with a precision of 50% CV) of molecular masses sampled from a mixture of two toxic chemicals that differ by 100% in molecular mass. (**5 points**)

6. A. What does it mean if the value 0.5 resides in the 95% confidence interval of an odds ratio determination equal to 3.5? (**5 points**)

B. What does a Pearson coefficient of determination, R^2, of 0.96 mean? Is it statistically significant? (**10 points**)

7. Read the attach article and answer the following questions.

A. Besides grammar or a typo, what is wrong with Stephen Taplin's quote?
"We need to follow up and find out if this a real association." (**5 points**)

B. What key piece of information from the study, that is required for a sound evaluation, is not given in the news article? (**5 points**)

C. How likely is it that Taplin and his colleagues will establish a cause-effect relationship in their next study? Support your answer. What effect might they look for in their current data set to help with this question? (**5 points**)