（總分為100分）

1. (10%) For a customer visit number and income study, the variance of the visit number (X) was 0.81. Then income related to the visit number is W=449+0.25X. Please estimate the variance of income.

2. (10%) For sampling size decision-making, the desired margin of sampling error is set to ± 5; the desired confidence coefficient $\alpha=0.05$; the planning value for the population standard deviation $\sigma=85$, please estimate the needed sample size for the survey. Note. z(0.975)=1.96.

3. (10%) Let V and W be two independent Poisson random variables with parameters .65 and .81, respectively. Please estimate the parameter with respect to the sum of V+W.

4. (5%) Regression model $Y_i = \beta_o + \beta_1 X_i + \beta_2 D_i + \varepsilon_i$ includes a dummy variable D_i, where the value is either zero or one. Please estimate the value of $E\{Y\}$ given the dummy variable is zero.

5. Let e_i be the least square residuals for the regression model $Y_i = \beta_o + \beta_1 X_i + \varepsilon_i$. Please estimate

(5%) (a). $\sum e_i$

(5%) (b). $\sum X_i e_i$

(5%) (c). $\sum \hat{Y_i} e_i$

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（總分為100分）

6. When the names of winners are revealed on Oscar night, months of suspense give way to tears, smiles and speeches. Yet when the curtain falls, one question remains: Who cast the votes?

About 37 million people tuned in to the Academy Awards last year, and a great deal rides on the show's outcome. Winning a golden statuette can vault an actor to stardom, add millions to a movie's box office and boost a studio's prestige. Yet the roster of all 5,765 voting members of the Academy of Motion Picture Arts and Sciences is a closely guarded secret. Even inside the movie industry, intense speculation surrounds the academy's composition and how that influences who gets nominated for and wins Oscars. The organization does not publish a membership list.

A Los Angeles Times study found that academy voters are markedly less diverse than the moviegoing public. Oscar voters are nearly 94% Caucasian. Blacks are about 2% of the academy, and Latinos are less than 2%, The Times found. Oscar voters have a median age of sixty-two, the study showed. People younger than fifty constitute just 14% of the membership.

The academy is primarily a group of working professionals, and nearly 50% of the academy's actors have appeared on screen in the last two years. But membership is generally for life, and hundreds of academy voters haven't worked on a movie in decades. Some are people who have left the movie business entirely but continue to vote on the Oscars — including a nun, a bookstore owner and a retired Peace Corps recruiter. Under academy rules, their votes count the same as ballots cast by the likes of Julia Roberts, George Clooney and Leonardo DiCaprio.

To conduct the study, Times reporters spoke with thousands of academy members and their representatives to confirm the identities of 5,100 voters — more than 89% of the voting members. Those interviews revealed 73% male. Some members see the varying opinions about the academy's race, sex and age breakdown simply as a mirror of hiring patterns in Hollywood, while others say it reflects the group's mission to recognize achievement rather than promote diversity. Many said the academy should be much more representative.

(For the following questions, show all the calculation, and then circle your answer to get full credit.)

6a) Find an estimated proportion of academy voters with an age between 50 and 62. (6 %)

6b) Find a 95% interval estimate of the proportion of male members of the academy voters. Please carry 4 decimal places in your calculation. (10 %)

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7. With more retailers opening their doors on Thanksgiving Day in the United States, some people still avoided shopping at brick-and-mortar stores. They would shop online instead. According to a survey by Accenture, 38.04% of American people said they were likely to shop on Thanksgiving Day (11/29) or that night. 55.29% of people were likely to hit the stores on the day after (11/30). Given those who planned on shopping on Thanksgiving Day or that night, only 28.11% of them said they would be doing most of their shopping in physical stores.

(For the following questions, show all the calculation, and then circle your answer to get full credit.)

7a) Find the proportion of American people who would shop online on Thanksgiving Day or that night. Please carry 4 decimal places in your calculation. (8 %)

7b) If the proportion of American people who would shop online after Thanksgiving Day is 0.3975, how will you describe the relationship between "date of shopping" and "place to shop"? (8 %)

（總分為100分）

8. Today on Amazon.com, one of the most popular video games being sold is titled "Call of Duty 4: Modern Warfare." In this game, players can take on the role of either a U.S. or British soldier who is sent to military "hot spots" to defeat the world's most dangerous enemies.

Many are quick to point out that most school shootings in recent years have been carried out by avid gamers, and their games of choice were always dark and violent. But it begs the question: Which comes first? Can aggressive and violent behavior be attributed to violence in video games? Or do those who play already have violent tendencies which draw them to violent games? It's a type of "chicken or the egg" debate that has strong advocates on both sides.

One of the primary concerns with violence in video games is that gaming is not passive. In order to play and win, the player has to be the aggressor. Rather than watching violence, as he might do on television, he's committing the violent acts.

Another factor that concerns both researchers and parents is that violence in video games is often rewarded rather than punished. In army and sniper games, players "level up" based in part on how many people they kill. If played frequently enough, games like this can skew a young person's perception of violence and its consequences.

In 2002, researchers Anderson and Bushman developed the General Aggression Model (GAM) - often considered one of the greatest contributions to the study of violence and video games. Long-term effects of violent video games are still uncertain and are fiercely debated. No long-term studies have been conducted to date, so there are only hypotheses. Anderson and Bushman theorized that excessive exposure to violent video games causes the formation of aggressive beliefs and attitudes, while also desensitizing gamers to violent behaviors.

Though long-term effects haven't been clinically documented, one need only look at the way video game violence has progressively increased over the past two decades to get a sense of potential long-term effects. Parents would be wise to monitor the amount of time their kids spend gaming and watch closely for any negative effects.

8a) For the relationship between violent video games and aggressive gamers Anderson and Bushman proposed, write down all the independent variables and all the dependent variables clearly. (8 %)

8b) What statistical analyses or methods can be used to test the relationship? (10 %)