**BINGO BONUS (10 POINTS):**

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Let’s consider the logistic regression model, which we will refer to as Model 1, given by

log(pi / [1-pi]) = 0.25 + 0.32\*X1 + 0.70\*X2 + 0.50\*X3

In the above formula, X3 is an indicator variable with X3=0 if the observation is from Group A and X3=1 if the observation is from Group B.

1. For X1=2 and X2=1 compute the **log-odds** for each group, i.e. X3=0 and X3=1.

**Log –odds** for Group A (X3 = 0) : 0.25 + 0.32\*2 + 0.70\*1 + 0.50\*0 => **1.59**

**Log –odds** for Group B (X3 = 1) : 0.25 + 0.32\*2 + 0.70\*1 + 0.50\*1 => **2.09**

1. For X1=2 and X2=1 compute the **odds** for each group, i.e. X3=0 and X3=1.

**Odds** for Group A (X3 = 0) : exp(Log –odds for Group A) => exp(1.59) => **4.903749**

**Odds** for Group B (X3 = 1) : exp(Log –odds for Group B) => exp(2.09) => **8.084915**

1. For X1=2 and X2=1 compute the **probability** of an event for each group, i.e. X3=0 and X3=1.

Odds/odds+1

**Probability** of an event for Group A (X3 = 0) : Odds for Group A/( 1+ Odds for Group A )

4.903749/(1+4.903749) => **0.8306161**

**Probability** of an event for Group B (X3 = 1) : Odds for Group B/( 1+ Odds for Group B )

8.084915/(1+8.084915) => **0.8899274**

1. Using the equation for Model 1, compute the relative odds associated with X3, i.e. the relative odds of Group B compared to Group A.

**Relative odds** of Group B compared to Group A can be directly calculated from the equation by taking exponent of X3 coefficient.

**Exp(0.50) => 1.648721**

Another way to first calculate the delta change in Log-Odds of Group B and Group A while keeping X1 and X2 constant.

Delta LogOdds = LogOdds Group B - LogOdds Group A (X1 and X2 constant)

Delta LogOdds = 0.50

Now the **relative odds** of Group B compared to Group A can be calculated by taking the exponent of Delta LogOdds .

**Exp (Delta LogOdds ) => Exp(0.50) => 1.648721**

1. Use the odds that you found in QUESTION 2 to compute the relative odds of Group B to Group A. How does this number compare to the result in Question #4. Does this make sense?

Relative odds of Group B to Group A based on question 2 = **Odds** for Group B/ **Odds** for Group A

= **8.084915/4.903749 => 1.648721**

This is as expected since the change in X3 value (1 to 0) is same in both question 4 and 5 hence relative odds or the odd ratio will be same.

HOW TO SUBMIT YOUR BINGO BONUS WORK:

1. Rename Your DOC File to be LOGIT\_ANALYSIS\_lastname\_firstname.docx
2. Email the DOC File to your Instructor