GVPT 729a: Special Topics in Quantitative Political Analysis, Advanced MLE
Problem Set 5

1. Suppose you have a theory that suggests that the probability of voting for the incumbent legislator vs. a single challenger from another party is a function of partisanship (incumbent party = 1, else = 0), views of the economy (1 = getting worse, 2 = same, 3 = improving), and education level (1 = less than high school, 2 = high school degree, 3 = college degree or more).

In terms of the **probability of voting for the incumbent** from a **probit model**, write out how you would obtain estimates so that you could then evaluate the substantive significance of changing views of the economy from getting worse to improving. Set up all relevant equations **COMPLETELY** (but do not solve them), briefly explain what each does (no more than 1 sentence for each equation), defining terms as necessary for someone to understand exactly what you are doing, and explain how you obtain the effect of changing views of the economy on the probability of voting for the incumbent (no more than 1 sentence). This should be written in general terms not as computer code. HINT: The coefficient values aren't given so first write out the main probit equation using the relevant betas and variable names. (10 points)

- $P(Y = 1| party, econ, edu) = \Phi (\beta_0 + B_1 party_i + B_2 econ_i + B_3 edu_i)$
  - This represents the model of voting for the incumbent (Y = 1), taking into consideration party, viewed of the economy and education level
- $Pr(Y_i = 1 \mid party, edu, econ = 3) = \Phi(\beta_0 + \beta_1 * party_i + \beta_2 * 3 + \beta_3 * edu_i)$
  - This equation is the probability of success (voting for the incumbent) when it is believed that the economy is improving
- $Pr(Y_i = 1| party, edu, econ = 1) = \Phi(\beta_0 + \beta_1 * party_i + \beta_2 * 1 + \beta_3 * edu_i)$
  - This equation is the probability of success (voting for the incumbent) when it is believed that the economy is getting worse
- $\Phi(\beta_0 + \beta_p * party_i + \beta_e * 3 + \beta_{ed} * edu_i) - \Phi(\beta_0 + \beta_1 * party_i + \beta_2 * 1 + \beta_3 * edu_i)$
  - This equation aims to find the difference in the probability of voting for the incumbent when it is believed that the economy is getting worse and when it is believed that the economy is improving

Run the code contained in mlogit examplev4.txt. Be sure to install packages listed that you have not yet installed.

2. Report the result you get for effect1 (just provide the number). (2 points)
    0.05849452

3. Report the result you get for effect2 (just provide the number). (2 points)
    -0.07420091

4. Report the confidence interval from result1 and indicate whether effect1 is statistically significant or not and why (1 sentence or less) (4 points)

2.5%	97.5%
0.01058129	0.10685935

Effect1 is statistically significant because the confidence interval listed above does not contain zero

5. **EXTRA CREDIT**: Report the confidence interval from result2 and indicate whether effect2 is statistically significant or not and why (1 sentence or less) (4 points)

```
    2.5%       97.5%
-0.11633445   -0.02970888
```

Effect2 is statistically significant because the confidence interval listed above does not contain zero

6. Run the code contained in oprobit examplev3.R. Be sure to install packages listed that you have not yet installed. Report the mean of effectoppose (2 points)

Mean of effectoppose = 0.04916407