Problem Set 3

Jack Merriman

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Question 1

Part 1:

```
#replace numerical values with categories
for (i in 1:length(df$GDPWdiff)) {
  if (df$GDPWdiff[i] > 0) {
    df$GDPWdiff[i] <- "positive"
  }
  if (df$GDPWdiff[i] < 0) {
    df$GDPWdiff[i] <- "negative"
  }
  if (df$GDPWdiff[i] == 0) {
    df$GDPWdiff[i] <- "no change"
  }
}
#turn the column into an unordered factor
df$GDPWdiff <- factor(df$GDPWdiff, c("no change", "negative", "positive"),
                      ordered = FALSE)
#create an unordered regression model
model1 <- multinom(GDPWdiff ~ OIL + REG, data = df)
summary(model1)
stargazer(model1)
#create predicted values for estimating cutoffs
unorderedPredict <- data.frame('OIL' = c(0,1,0,1),'REG' = c(0,0,1,1))
predictValues1 <- predict(model1, unorderedPredict, type = 'probs')
rownames(predictValues1) <- c('<50%, non-democracy', '>50%, non-democracy',
                              '<50%, democracy', '>50%, democracy')
```

Table 1:

	Dependent variable:	
	negative	positive
	(1)	(2)
OIL	4.784	4.576
	(6.885)	(6.885)
REG	1.379*	1.769**
	(0.769)	(0.767)
Constant	3.805***	4.534***
	(0.271)	(0.269)
Akaike Inf. Crit.	4,690.770	4,690.770
Note:	*p<0.1; **p<0.05; ***p<0.01	

```
Predicted Values
                       no change  negative  positive
<50%, non-democracy 7.191671e-03 0.3232070 0.6696013
>50%, non-democracy 6.934296e-05 0.3726529 0.6272778
<50%, democracy     1.378186e-03 0.2460217 0.7526001
>50%, democracy     1.344048e-05 0.2869004 0.7130862
```

OIL:
A country having an oil to total exports ratio $> 50\%$ will see an average increase of 4.784 in the log odds of having negative economic growth vs. no economic growth, and an average increase of 4.576 in the log odds of having positive economic growth vs. no economic growth compared to a country with an oil to exports ratio $< 50\%$, holding all other variables constant.

REG:
A democratic country will see an average increase of 1.379 in the log odds of having negative economic growth vs. no economic growth, and an average increase of 1.769 in the log odds of having positive economic growth vs. no economic growth compared to a non-democratic country, holding all other variables constant.

Constant:
A non-democratic country with an oil to total exports ratio $< 50\%$ has an average log odds of 3.805 of having negative economic growth vs. no economic growth, and an average log odds of 4.534 of having positive economic growth vs. no economic growth.

Part 2:

Table 2:

	Dependent variable:
	oGDPWdiff
OIL	-0.199^{*}
	(0.116)
REG	0.398^{***}
	(0.075)
Observations	3,721
Note:	*p<0.1; **p<0.05; ***p<0.01

```r
#Make the factor ordered
df$oGDPWdiff <- factor(factor(df$GDPWdiff, c("negative", "no change", "
    positive"),
                              ordered = TRUE))
#Run ordered logit regression
model2 <- polr(oGDPWdiff ~ OIL + REG, data = df, Hess = TRUE)
summary(model2)
stargazer(model2)
#Predict values
predictValues2 <- predict(model2, unorderedPredict, type = 'probs')
rownames(predictValues2) <- c('<50%, non-democracy', '>50%, non-democracy',
                              '<50%, democracy', '>50%, democracy')
```

```
                      negative   no change  positive
<50%, non-democracy 0.3249362 0.004555476 0.6705083
>50%, non-democracy 0.3699431 0.004836151 0.6252207
<50%, democracy     0.2442235 0.003839727 0.7519368
>50%, democracy     0.2827332 0.004215307 0.7130515
```

OIL:
A country having an oil to total exports ratio $> 50\%$ will see an average decrease of 0.199 in the log odds of moving up an ordinal category from negative compared to a country with an oil to exports ratio $< 50\%$, holding all other variables constant.

REG:
A democratic country will see an average increase of 0.398 in the log odds of moving up an ordinal category from negative compared to a non-democratic country, holding all other variables constant.

Question 2

(a)

```
#create poisson regression
mexmodel <- glm(
  PAN.visits.06 ~ competitive.district + marginality.06 + PAN.governor.06,
  data = mexico,
  family = poisson
  )
```

Table 3:

	Dependent variable:
	PAN.visits.06
competitive.district	−0.081
	(0.171)
marginality.06	−2.080***
	(0.117)
PAN.governor.06	−0.312*
	(0.167)
Constant	−3.810***
	(0.222)
Observations	2,407
Log Likelihood	−645.606
Akaike Inf. Crit.	1,299.213
Note:	*p<0.1; **p<0.05; ***p<0.01

The coefficient associated with the competitive district is very small at −0.081, the `summary()` function in R outputs a Z test statistic for the competitive district coefficient of −0.477 which equates to a p-value of 0.6336, which is not statistically significant at any reasonable level of confidence, therefore we can conclude that there is no evidence that PAN presidential candidates visit swing districts more frequently.

(b)

We first exponentiate our coefficients to interpret them:

```
exp(coef(mexmodel))
```

```
(Intercept) competitive.district       marginality.06      PAN.governor.06
 0.02214298           0.92186932           0.12491227           0.73228985
```

`marginality.06`:

An increase of one in the marginality score (poverty measure) in a district is associated with a decrease in the expected number of visits by the PAN candidate to the district by a multiplicative factor of 0.124, holding all other variables constant.

`PAN.governor.06`:

Districts with PAN governors are associated with an average decrease in the expected number of visits by the PAN candidate to the district by a multiplicative factor of 0.73, relative to districts without a PAN governor, holding all other variables constant.

(c)

```
#Set all coefficients to 1 as they are intercept and dummy variables.
    Marginality to 0
hypLambda <- exp(coefs[1] + coefs[2]*0 + coefs[3] + coefs[4])
hypLambda
```

$\lambda = 0.002$

There is a mean expected visits number of 0.002 which implies it is unlikely that a PAN candidate would visit this district.