STAT 217: Quiz 17

1. 800 subjects were randomly divided into two groups and given a placebo or vitamin C to take during the cold season. At the end of the cold season, the subjects were interviewed by a physician who determined whether they had or had not suffered a cold during the period. Below is a table with the data. State whether a homogeneity test or an independence test is more appropriate.

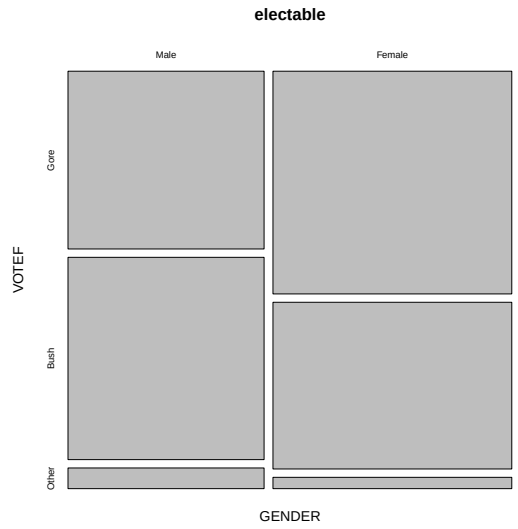
```
##   Treatment Cold NoCold
## 3   placebo   62     26
## 4      vitC  157     75
```

2. 1160 randomly selected Americans were asked about their gender and who they voted for in the 2000 presidential elections. Below is a table of the data.

   (a) Would you use a chi-square test of independence or homogeneity?

```
##          VOTEF
## GENDER   Gore Bush Other
##   Male    232  264    27
##   Female  354  265    18
```

   (b) What is the name of the plot below?



   (c) Write the hypotheses of interest.

(d) Just by looking at the plot, do you think you will reject or FTR the null hypothesis? Briefly explain.

(e) Are the assumptions and conditions met to conduct a parametric chi-squared test (yes or no)? If you answer no, state the assumption(s) that are not met and why.

(f) Below is output from the chisq.test function. You can see that the degrees of freedom is spit out for you. Show how you would calculate these df by hand.

```
chisq.test(electable)

##
##  Pearson's Chi-squared test
##
## data:  electable
## X-squared = 16.15, df = 2, p-value = 0.0003106
```

(g) Sketch a picture of the appropriate chi-squared distribution and draw a vertical line at your test statistic. Shade the area that represents the p-value.

(h) State your conclusion.

3. Which of the following is not one of the assumptions necessary for a parametric chi-square test?

   (a) Normality

   (b) Independence

   (c) Randomization

   (d) Expected Counts > 5

4. The χ^2 test of the table gives the output below. Using $\alpha = 0.01$, what decision should we make and what are the degrees of freedom for the test?

   ```
   X-squared = 30.679, df = ---, p-value = 0.0002
   ```

   (a) FTR H_0, 15 df

   (b) Reject H_0, 8 df

   (c) FTR H_0, 12 df

   (d) Reject H_0, 15 df

5. Expected counts under the null hypothesis are shown below. Are the assumptions for inference with a chi-square test satisfied?

	Ranking				
Location	1-100	101-200	201-300	301-400	401-500
North and Latin America	39.8	40.2	39.8	40.6	39.4
Europe	41.6	42	41.6	42.5	41.2
Asia/Africa/Pacific	18.58	18.7	18.5	18.7	18.3

   (a) No, the observed counts are too close to the expected counts

   (b) No, the expected cell counts condition is violated

   (c) No, the data are quantitative

   (d) Yes

6. **Extra Credit** If the chi squared test statistic is relatively large, this provides evidence against the null hypothesis. Explain why.