

Homework 2

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Instructions

1. Take a data set that you are currently working on, and select a small number of variables of interest from it-fewer than ten. You can do this manually if you like-e.g. in Stata, or Excel-or you can use the `subset()` function to select data from the full dataset. Either way is fine.
2. Using RStudio, create either an RMarkdown file (preferred) or an .R file (also OK) that does the following:
 - Get the data into R so you can work with it
 - Produce numerical summaries of the variables with `summary()` or similar
 - Use `ggplot` to produce histograms or some other appropriate 1-D distributional summary of each variable separately
 - Use `ggplot` and `GGally` packages together to produce a pairs or generalized pairs plot of all the variables together
 - Select two or three variables and look at their bivariate relationships more closely. E.g. you might produce a scatterplot & smoother of two continuous variables, or see how the distribution of some continuous variable (e.g. income) varies by a categorical variable (e.g. level of education)
3. Produce a PDF of the results and send it to me, OR use RStudio's publication feature to make a publicly accessible HTML version on its RPub service. If you use RMarkdown this should be straightforward. If you use an .R script, save the graphical output into individual files and include them in a single PDF document. Your document should contain brief linking information (i.e. literally one or two sentences) explaining what each variable and plot is. You can do as many plots as you like, but at a minimum please show me summaries of each variable individually, a pairs plot, and at least two bivariate or multivariate plots.

```
setwd("C:/Users/Simon/OneDrive/Documents/Github/Data-Visualization/")
library(foreign)
library(ggplot2)
library(GGally)
NCS <- read.dta("NCS.dta")
attach(NCS)
```

I am using data from the National Congregations Study (NCS). I've included variables measuring religious tradition, size of the congregation, clergy's race, congregation's income, the percentage of homosexual attendees, restrictions on homosexual membership and leadership, and how liberal or conservative the congregation is.

```
head(NCS)
```

##	DENCODE3	numadlts	clerrace	income	gaypct	mbrgay
## 1	Lutheran	350	White	291000	NA	<NA>
## 2	Baptist	50	Black or African American	65000	NA	<NA>
## 3	Methodist	155	White	233558	NA	<NA>
## 4	Roman Catholic	275	White	159924	NA	<NA>

```
## 5 Roman Catholic      2200      White 1136253      NA      <NA>
## 6      Lutheran        600      White 1000000      NA      <NA>
##      ldrgay              libcon
## 1      <NA> More on the conservative side
## 2      <NA>              Right in the middle
## 3      <NA> More on the conservative side
## 4      <NA> More on the conservative side
## 5      <NA> More on the conservative side
## 6      <NA> More on the conservative side
```

Univariate statistics

Note that all results are unweighted. Because the NCS is a hypernetwork sample, the distribution is representative of *attendees* and not congregations.

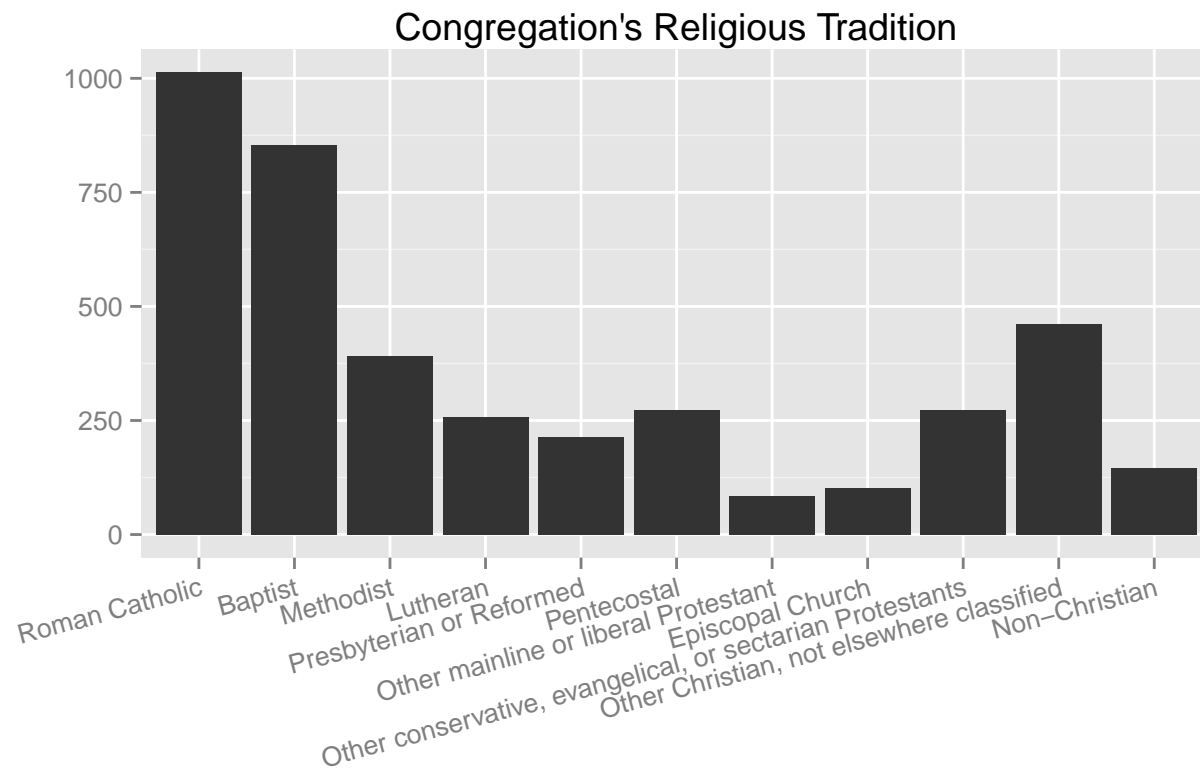
For example, the average attendee has 776 adults in their congregation (`numadlts`). Likewise, roughly half (1,388 of 2816) of attendees in the US are in congregations in which homosexuals are allowed to become members (`mbrgay`)

```
counter <- 1
angle1 <- c(15, 15, 0, 0, 15)
horz <- c(1, 1, 0.5, 0.5, 1)
for(i in list(DENCODE3, clerrace, mbrgay, ldrgay, libcon)){
  print(discrete.title[counter], quote = FALSE)
  print(discrete.description[counter], quote = FALSE)
  print(summary(i), quote = FALSE)

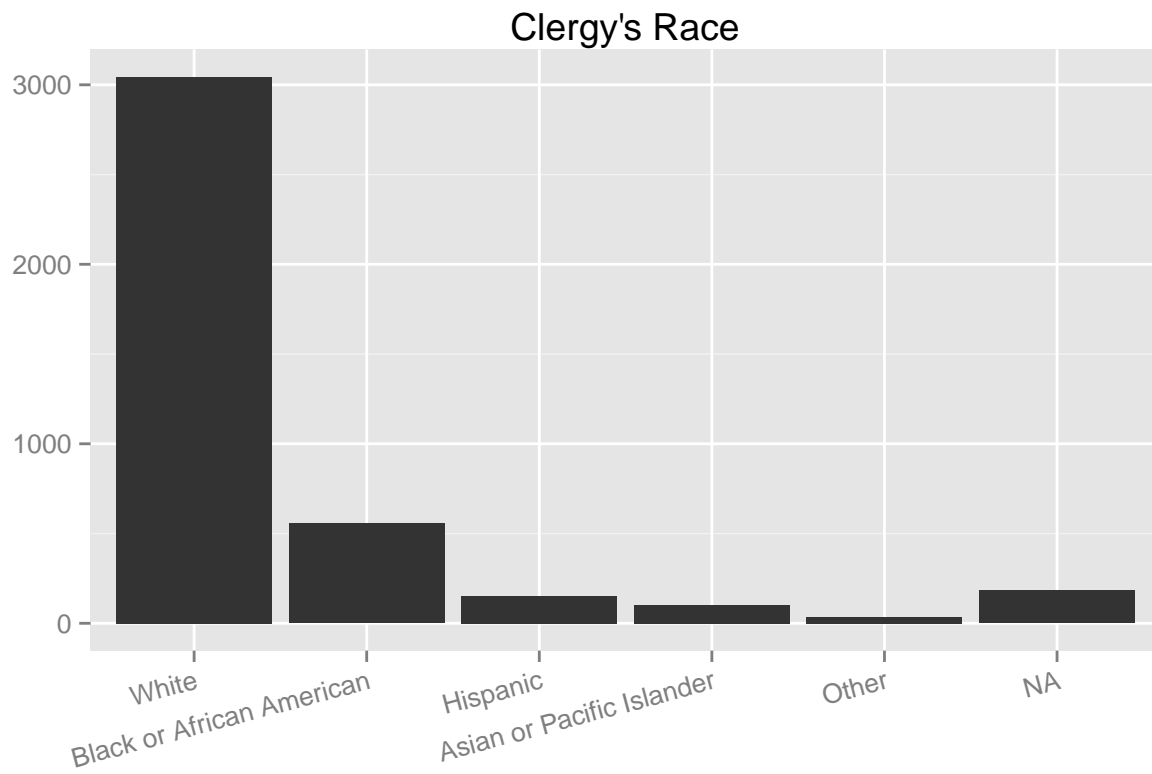
  temp.fig <- ggplot(data = NCS) +
    geom_histogram(aes(x = i)) +
    ggtitle(discrete.title[counter]) +
    ylab("") +
    xlab("") +
    theme(axis.text.x = element_text(angle = angle1[counter], hjust = horz[counter]))
  print(temp.fig)
  counter <- counter + 1
}
```

```
## [1] Congregation's Religious Tradition
## [1] Catholic parishes make up the majority of the NCS data, followed by Baptists. No other group has
##
##      Roman Catholic
##      1013
##      Baptist
##      854
##      Methodist
##      392
##      Lutheran
##      258
##      Presbyterian or Reformed
##      213
##      Pentecostal
##      274
##      Other mainline or liberal Protestant
##      85
```

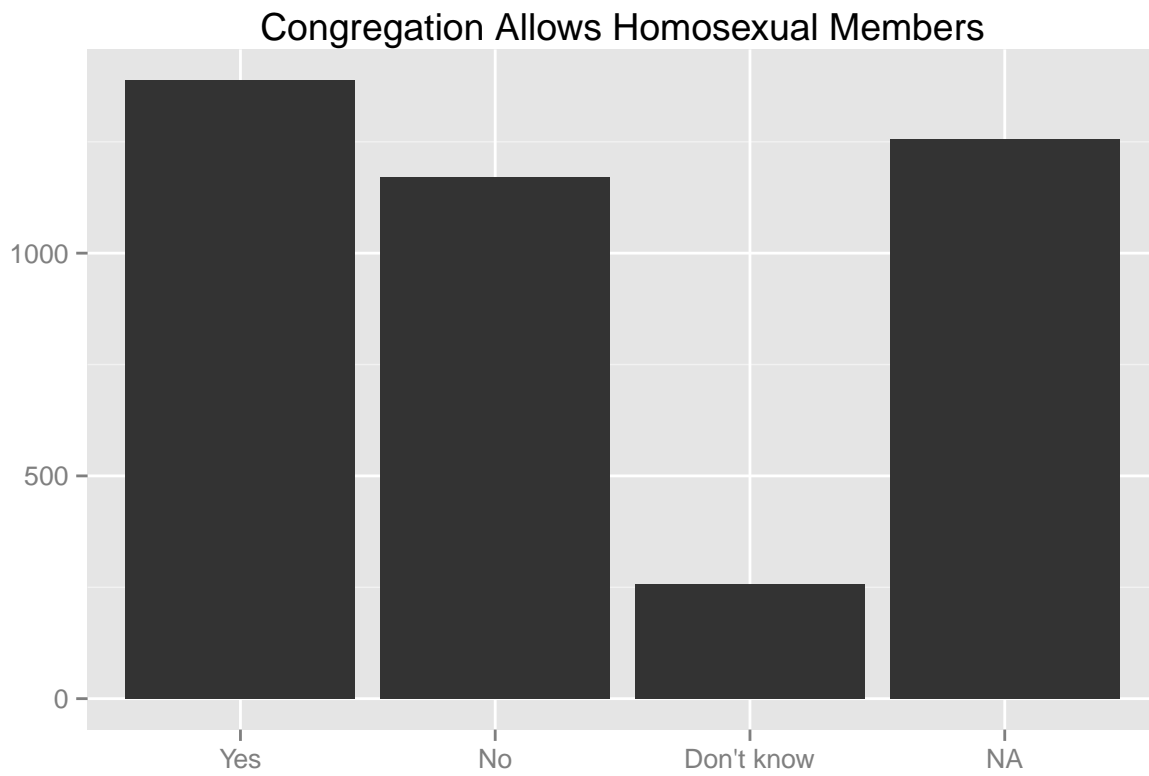
```
##                                Episcopal Church
##                                103
## Other conservative, evangelical, or sectarian Protestants
##                                272
## Other Christian, not elsewhere classified
##                                462
##                                Non-Christian
##                                145
```



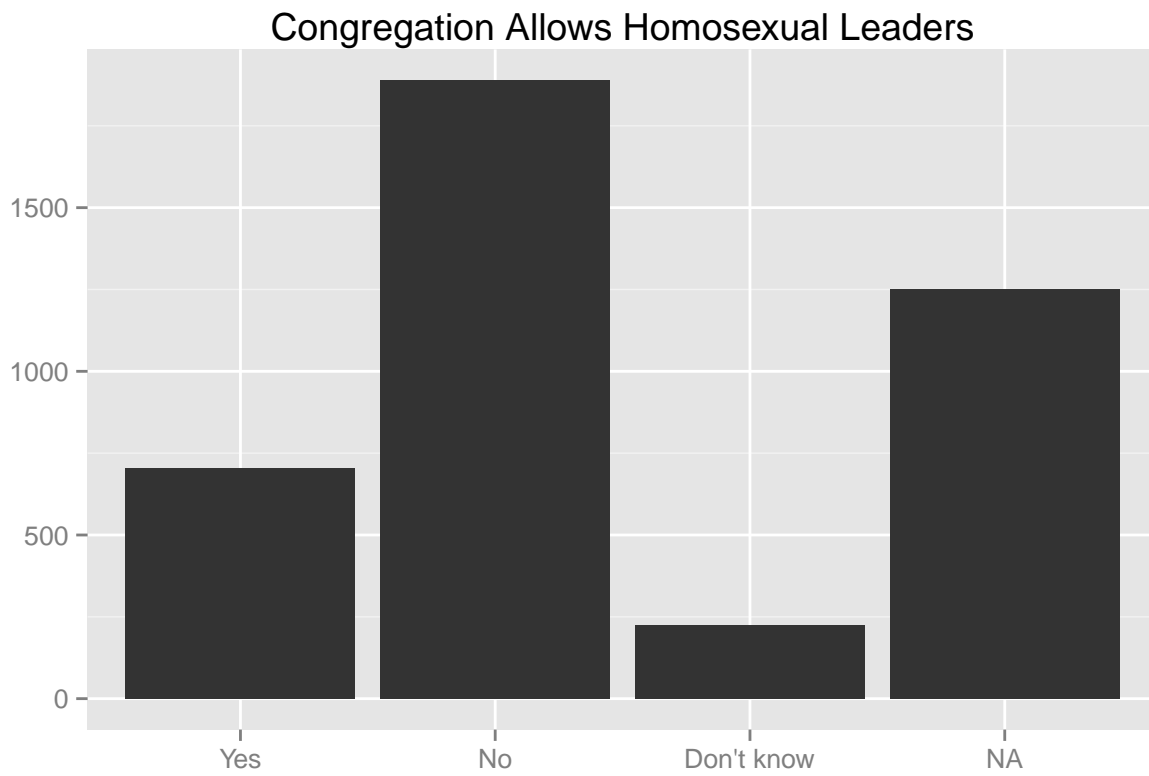
```
## [1] Clergy's Race
## [1] Clergy are overwhelmingly white in the NCS.
##                                White Black or African American
##                                3045                                556
##                                Hispanic Asian or Pacific Islander
##                                151                                102
##                                Other                                NA's
##                                34                                183
```



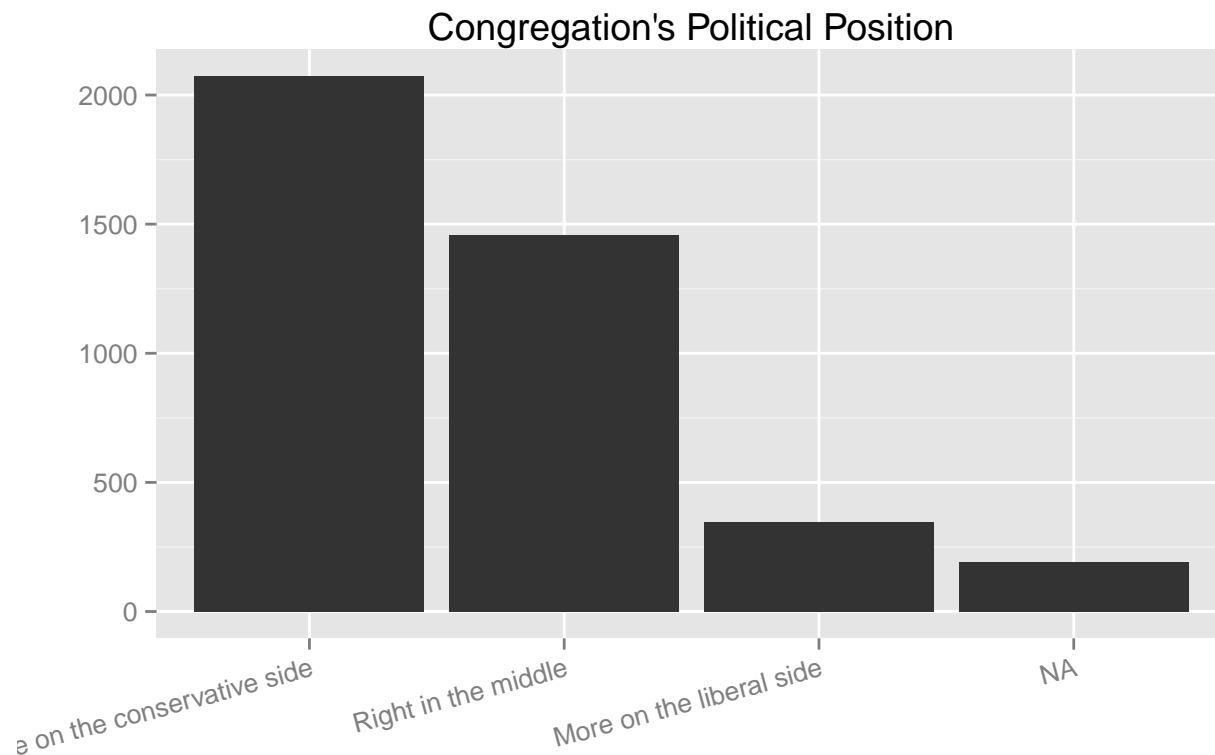
```
## [1] Congregation Allows Homosexual Members
## [1] Nearly half of individuals are in a congregation that allows homosexual members.
##      Yes      No Don't know    NA's
##      1388    1170      258     1255
```



```
## [1] Congregation Allows Homosexual Leaders
## [1] Most individuals are in a congregation that restricts homosexuals from becoming leaders.
##      Yes      No Don't know    NA's
##      705     1889      226     1251
```



```
## [1] Congregation's Political Position
## [1] Most individuals are in congregations that are conservative or moderate. Relatively few are in l
## More on the conservative side      Right in the middle
##                                2073                        1459
## More on the liberal side            NA's
##                                347                         192
```



```

counter <- 1
for(i in list(numadlts, income, gaypct)){
  print(continuous.title[counter], quote = FALSE)
  print(continuous.description[counter], quote = FALSE)
  print(summary(i), quote = FALSE)

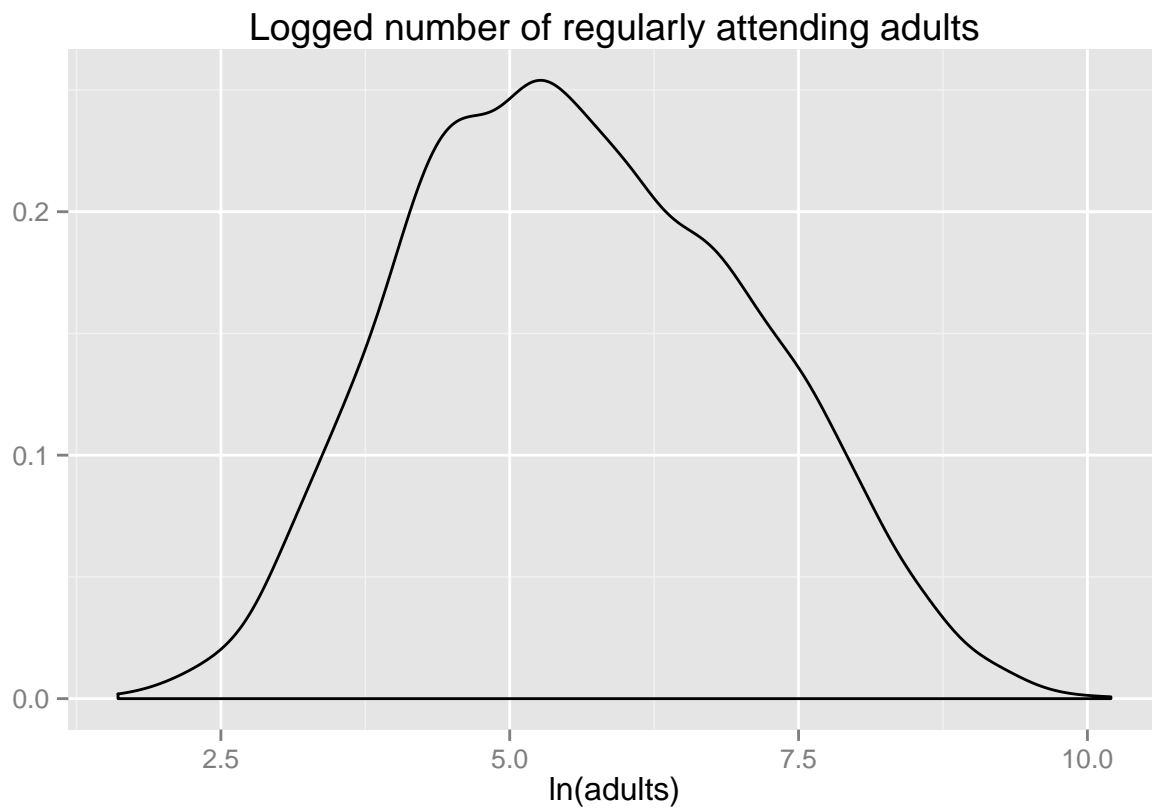
  temp.fig <- ggplot(data = NCS) +
    geom_density(aes(x = log(i))) +
    ggtitle(continuous.title[counter]) +
    ylab("") +
    xlab(continuous.label[counter])
  print(temp.fig)
  counter <- counter + 1
}

```

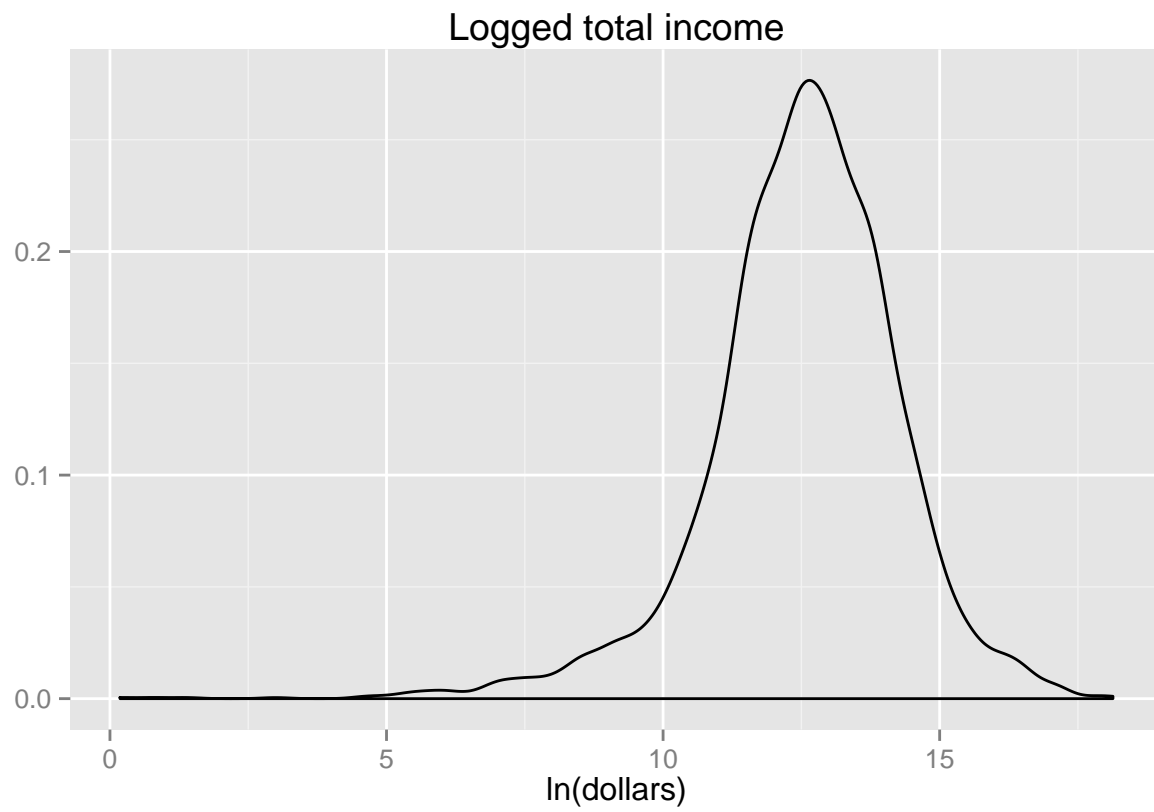
```

## [1] Logged number of regularly attending adults
## [1] The average attendee has 776 adults that regularly attend their congregation. The median attendee
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    5.0   90.0   250.0   775.9  800.0 27000.0

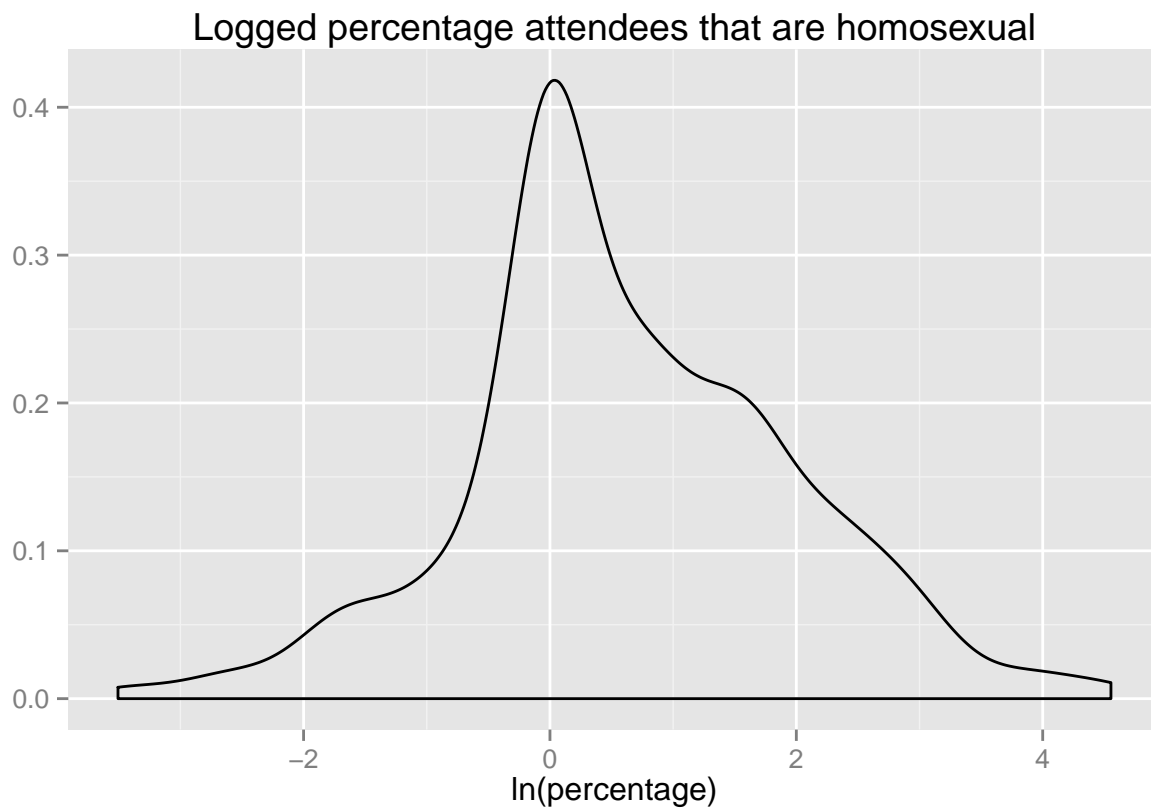
```



```
## [1] Logged total income
## [1] The average attendee is in a congregation that brings in just under $1,000,000 a year, though th
##      Min.   1st Qu.   Median     Mean 3rd Qu.    Max.     NA's
##         0   109400   300000   991300 800000 75000000    886
```

```
## [1] Logged percentage attendees that are homosexual
## [1] While the average attendee's congregation is 1.4% made up of homosexual members, the median is 0
##   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
## 0.0000 0.0000 0.0000 1.4220 0.6667 95.0000 2824
```

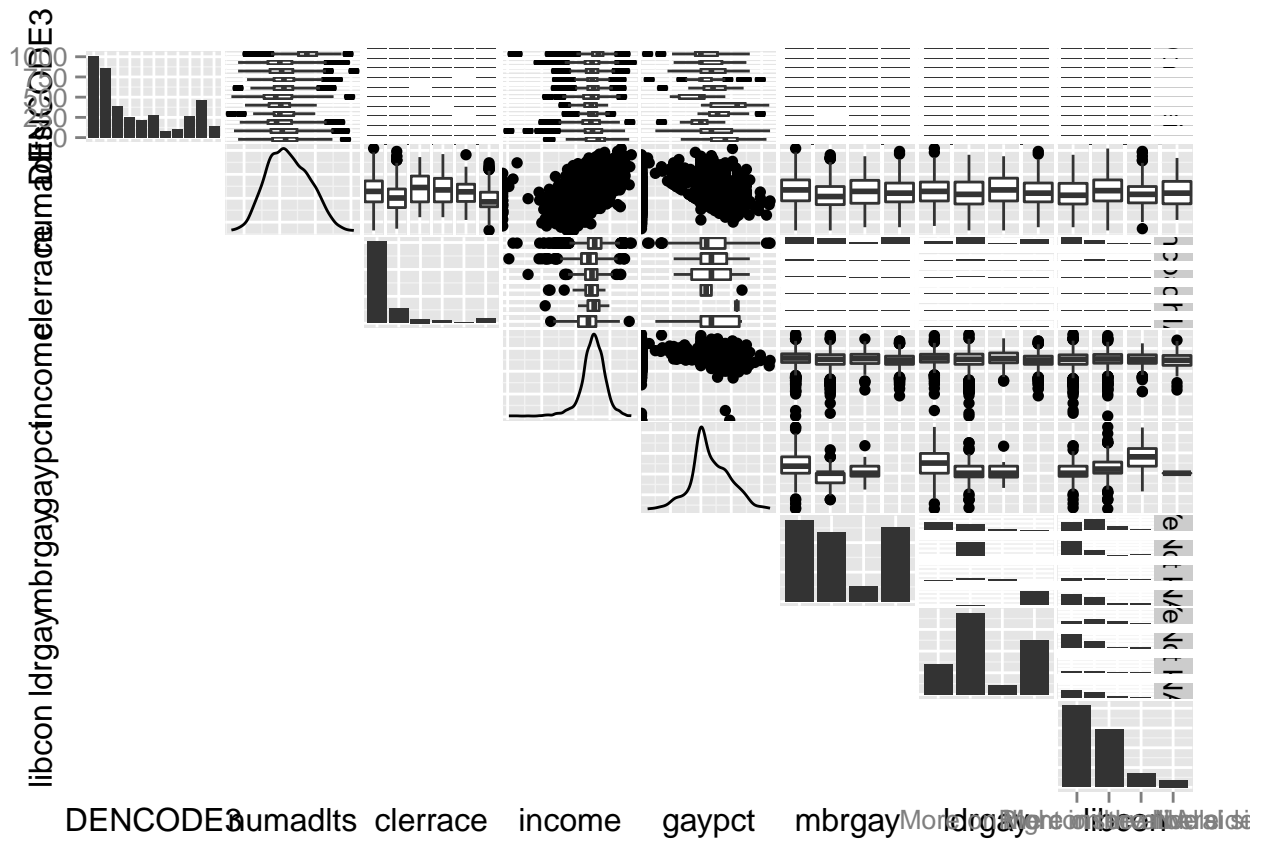


Bivariate relationships

First, I produce a pairs plot of all of my variables to look for concerning patterns.

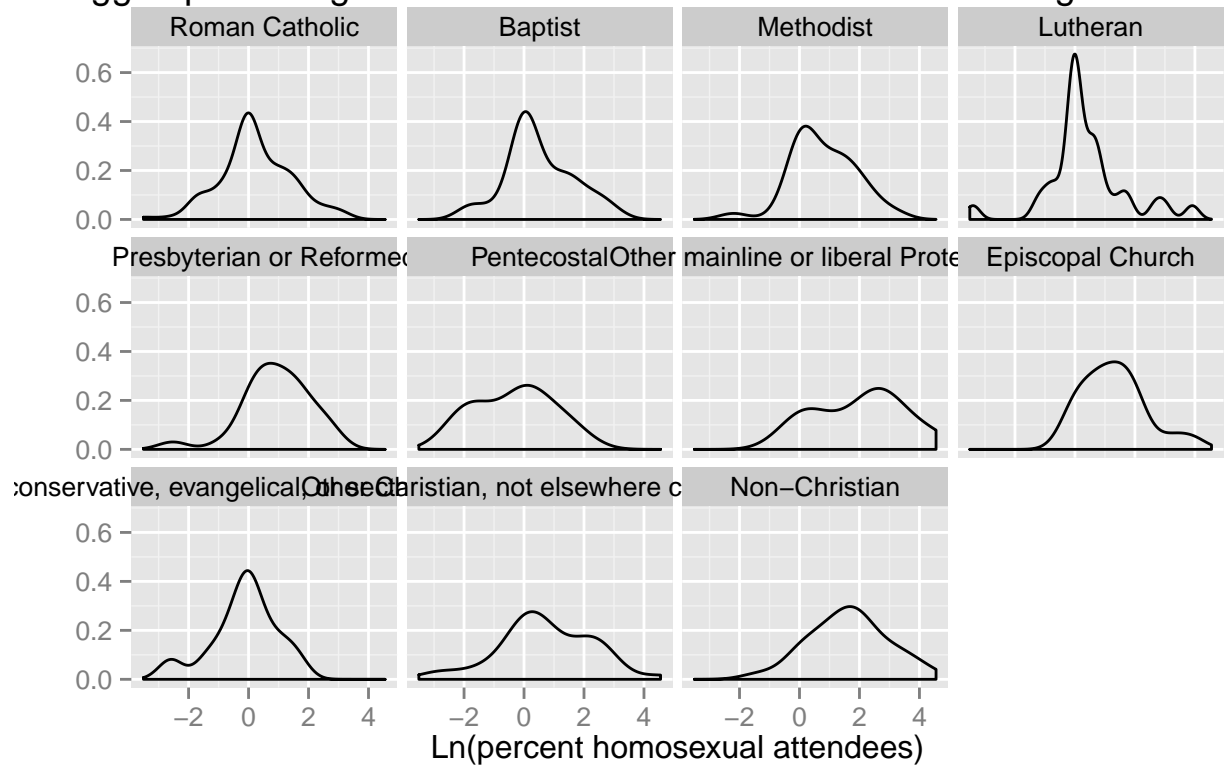
```
NCS.log <- NCS
NCS.log$numadlts <- log(NCS$numadlts)
NCS.log$income <- log(NCS$income)
NCS.log$gaypct <- log(NCS$gaypct)

ggpairs(NCS.log,
  upper = list(continuous = "smooth", combo = "box", discrete = "facetbar"),
  lower = list(continuous = "blank", combo = "blank", discrete = "blank"))
```



While not seemingly significantly different, it looks like there's some variation in the percentage of homosexuals in congregations by religious tradition. I look at this further, first, with a density plot to show the distributions, and second, with box plots.

Logged percentage homosexual attendees across eleven religious traditio



Logged percentage homosexual attendees across elev

