HW#4

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12.6.1

```
library("tidyverse")
```

Case Study

```
who1 <- who %>%
  gather(new_sp_m014:newrel_f65, key = "key", value = "cases", na.rm = TRUE)
glimpse(who1)
```

```
## Observations: 76,046
## Variables: 6
## $ country <chr> "Afghanistan", "Afghanistan", "Afghanistan", "Afghanis...
## $ iso2    <chr> "AF", "AF", "AF", "AF", "AF", "AF", "AF", "AF", "AF", ...
## $ iso3    <chr> "AFG", "AFG", "AFG", "AFG", "AFG", "AFG", "AFG", "AFG"...
## $ year    <int> 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, ...
## $ key     <chr> "new_sp_m014", "new_sp_m014", "new_sp_m014", "new_sp_m...
## $ cases   <int> 0, 30, 8, 52, 129, 90, 127, 139, 151, 193, 186, 187, 2...
```

```
who2 <- who1 %>%
 mutate(key = stringr::str_replace(key, "newrel", "new_rel"))
```

```
who3 <- who2 %>%
  separate(key, c("new", "type", "sexage"), sep = "_")
who3
```

```
## # A tibble: 76,046 x 8
##    country     iso2  iso3   year new   type  sexage cases
##    <chr>       <chr> <chr> <int> <chr> <chr> <chr>  <int>
##  1 Afghanistan AF    AFG    1997 new   sp    m014       0
##  2 Afghanistan AF    AFG    1998 new   sp    m014      30
##  3 Afghanistan AF    AFG    1999 new   sp    m014       8
##  4 Afghanistan AF    AFG    2000 new   sp    m014      52
##  5 Afghanistan AF    AFG    2001 new   sp    m014     129
##  6 Afghanistan AF    AFG    2002 new   sp    m014      90
##  7 Afghanistan AF    AFG    2003 new   sp    m014     127
##  8 Afghanistan AF    AFG    2004 new   sp    m014     139
##  9 Afghanistan AF    AFG    2005 new   sp    m014     151
## 10 Afghanistan AF    AFG    2006 new   sp    m014     193
## # ... with 76,036 more rows
```

```
who3 %>%
  count(new)
```

```
## # A tibble: 1 x 2
##   new       n
```

```
##   <chr> <int>
## 1 new   76046
```

```
who4 <- who3 %>%
  select(-new, -iso2, -iso3)
```

```
who5 <- who4 %>%
  separate(sexage, c("sex", "age"), sep = 1)
who5
```

```
## # A tibble: 76,046 x 6
##    country      year type  sex   age   cases
##    <chr>       <int> <chr> <chr> <chr> <int>
##  1 Afghanistan  1997 sp    m     014       0
##  2 Afghanistan  1998 sp    m     014      30
##  3 Afghanistan  1999 sp    m     014       8
##  4 Afghanistan  2000 sp    m     014      52
##  5 Afghanistan  2001 sp    m     014     129
##  6 Afghanistan  2002 sp    m     014      90
##  7 Afghanistan  2003 sp    m     014     127
##  8 Afghanistan  2004 sp    m     014     139
##  9 Afghanistan  2005 sp    m     014     151
## 10 Afghanistan  2006 sp    m     014     193
## # ... with 76,036 more rows
```

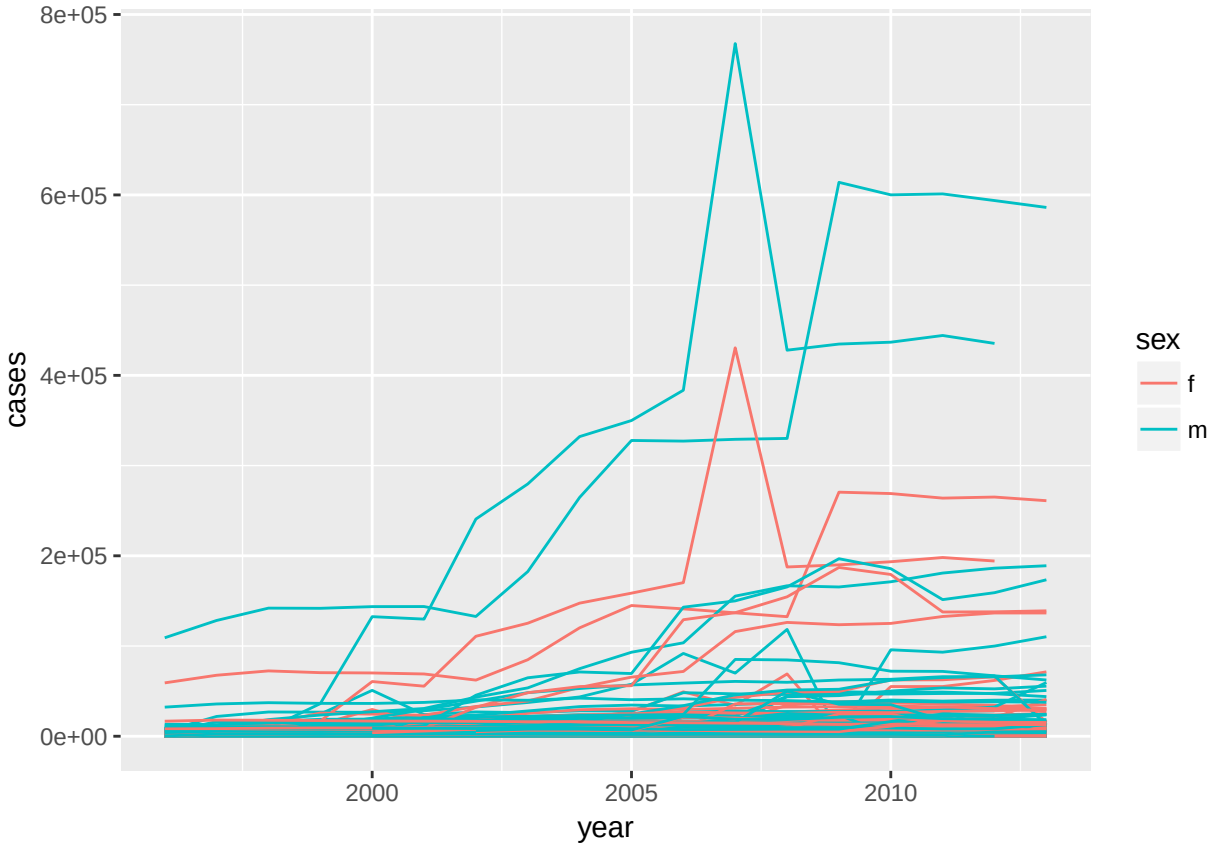
3. I claimed that `iso2` and `iso3` were redundant with country. Confirm this claim.

```
select(who3, country, iso2, iso3) %>%
  distinct() %>%
  group_by(country) %>%
  filter(n() > 1)
```

```
## # A tibble: 0 x 3
## # Groups:   country [0]
## # ... with 3 variables: country <chr>, iso2 <chr>, iso3 <chr>
```

4. For each country, year, and sex compute the total number of cases of TB. Make an informative visualization of the data.

```
who5 %>%
  group_by(country, year, sex) %>%
  filter(year > 1995) %>%
  summarise(cases = sum(cases)) %>%
  unite(country_sex, country, sex, remove = FALSE) %>%
  ggplot(aes(x = year, y = cases, group = country_sex, colour = sex)) +
  geom_line()
```



A small multiples plot faceting by country is difficult given the number of countries. Focusing on those countries with the largest changes or absolute magnitudes after providing the context above is another option.

10.5

Tibbles

```
library("tidyverse")
```

Exercises

5. What does `tibble::enframe()` do? When might you use it?

It converts named vectors to a data frame with names and values

```
?tibble::enframe
```

```
enframe(c(a = 1, b = 2, c = 3))
```

```
## # A tibble: 3 x 2
##   name  value
##   <chr> <dbl>
## 1 a      1.00
## 2 b      2.00
## 3 c      3.00
```

table 4 -> table 6

```
library(foreign)
library(stringr)
library(plyr)
```

```
## ------------------------------------------------------------------------
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)
```

```
## ------------------------------------------------------------------------
```

```
##
## Attaching package: 'plyr'
```

```
## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```
## The following object is masked from 'package:purrr':
##
##     compact
```

```
library(reshape2)
```

```
##
## Attaching package: 'reshape2'
```

```
## The following object is masked from 'package:tidyr':
##
##     smiths
```

```
source("xtable.r")

# Data from http://pewforum.org/Datasets/Dataset-Download.aspx

# Load data ---------------------------------------------------------------

pew <- read.spss("pew.sav")
```

```
## re-encoding from CP1252
```

```
## Warning in read.spss("pew.sav"): Undeclared level(s) 2, 3, 4, 9 added in
## variable: density3
```

```
## Warning in read.spss("pew.sav"): Duplicated levels in factor denom:
## Electronic ministries
```

```
## Warning in read.spss("pew.sav"): Undeclared level(s) 1, 2, 3, 4, 5, 6, 7,
## 8, 9, 10, 11, 12, 14, 16, 23, 33 added in variable: children
```

```
## Warning in read.spss("pew.sav"): Undeclared level(s) 18, 19, 20, 21, 22,
## 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,
## 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60,
## 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79,
## 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96 added in
## variable: age
```

```
pew <- as.data.frame(pew)


religion <- pew[c("q16", "reltrad", "income")]
religion$reltrad <- as.character(religion$reltrad)
religion$reltrad <- str_replace(religion$reltrad, " Churches", "")
religion$reltrad <- str_replace(religion$reltrad, " Protestant", " Prot")
religion$reltrad[religion$q16 == " Atheist (do not believe in God) "] <- "Atheist"
religion$reltrad[religion$q16 == " Agnostic (not sure if there is a God) "] <- "Agnostic"
religion$reltrad <- str_trim(religion$reltrad)
religion$reltrad <- str_replace_all(religion$reltrad, " \\(.*?\\)", "")

religion$income <- c("Less than $10,000" = "<$10k",
                     "10 to under $20,000" = "$10-20k",
                     "20 to under $30,000" = "$20-30k",
                     "30 to under $40,000" = "$30-40k",
                     "40 to under $50,000" = "$40-50k",
                     "50 to under $75,000" = "$50-75k",
                     "75 to under $100,000" = "$75-100k",
                     "100 to under $150,000" = "$100-150k",
                     "$150,000 or more" = ">150k",
                     "Don't know/Refused (VOL)" = "Don't know/refused")[religion$income]

religion$income <- factor(religion$income, levels = c("<$10k", "$10-20k", "$20-30k", "$30-40k", "$40-50
                                                      "$75-100k", "$100-150k", ">150k", "Don't know/refu

counts <- count(religion, c("reltrad", "income"))
names(counts)[1] <- "religion"

raw <- dcast(counts, religion ~ income)
```

```
## Using freq as value column: use value.var to override.
```

```
head(raw, 10)
```

```
##                   religion <$10k $10-20k $20-30k $30-40k $40-50k $50-75k
## 1                 Agnostic    27      34      60      81      76     137
## 2                  Atheist    12      27      37      52      35      70
## 3                 Buddhist    27      21      30      34      33      58
## 4                 Catholic   418     617     732     670     638    1116
## 5       Don’t know/refused    15      14      15      11      10      35
## 6         Evangelical Prot   575     869    1064     982     881    1486
## 7                    Hindu     1       9       7       9      11      34
## 8  Historically Black Prot   228     244     236     238     197     223
## 9        Jehovah's Witness    20      27      24      24      21      30
## 10                   Jewish    19      19      25      25      30      95
##    $75-100k $100-150k >150k Don't know/refused
## 1       122       109    84                 96
## 2        73        59    74                 76
## 3        62        39    53                 54
## 4       949       792   633               1489
## 5        21        17    18                116
## 6       949       723   414               1529
## 7        47        48    54                 37
```

```
## 8       131        81    78                339
## 9        15        11     6                 37
## 10       69        87   151                162
```

```
newraw <-
raw %>%
  gather(key = "income", value = "freq", -religion) %>%
  arrange(religion)
head(newraw, 10)
```

```
##    religion             income freq
## 1  Agnostic              <$10k   27
## 2  Agnostic            $10-20k   34
## 3  Agnostic            $20-30k   60
## 4  Agnostic            $30-40k   81
## 5  Agnostic            $40-50k   76
## 6  Agnostic            $50-75k  137
## 7  Agnostic           $75-100k  122
## 8  Agnostic          $100-150k  109
## 9  Agnostic              >150k   84
## 10 Agnostic Don't know/refused   96
```

table 7 -> table 8

```
options(stringsAsFactors = FALSE)
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:plyr':
##
##     here
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
library(reshape2)
library(stringr)
library(plyr)
source("xtable.r")

raw <- read.csv("billboard.csv")
raw <- raw[, c("year", "artist.inverted", "track", "time", "date.entered",
               "x1st.week", "x2nd.week", "x3rd.week", "x4th.week", "x5th.week",
               "x6th.week", "x7th.week", "x8th.week", "x9th.week", "x10th.week",
               "x11th.week", "x12th.week", "x13th.week", "x14th.week", "x15th.week",
               "x16th.week", "x17th.week", "x18th.week", "x19th.week", "x20th.week",
               "x21st.week", "x22nd.week", "x23rd.week", "x24th.week", "x25th.week", "x26th.week", "x27
names(raw)[2] <- "artist"

raw$artist <- iconv(raw$artist, "MAC", "ASCII//translit")
raw$track <- str_replace(raw$track, " \\(.*?\\)", "")
names(raw)[-(1:5)] <- str_c("wk", 1:76)
```

```r
raw <- arrange(raw, year, artist, track)

long_name <- nchar(raw$track) > 20
raw$track[long_name] <- paste0(substr(raw$track[long_name], 0, 20), "...")
head(raw,10)
```

```
##    year         artist                    track time date.entered wk1 wk2
## 1  2000          2 Pac          Baby Don't Cry 4:22   2000-02-26  87  82
## 2  2000        2Ge+her The Hardest Part Of ... 3:15   2000-09-02  91  87
## 3  2000   3 Doors Down              Kryptonite 3:53   2000-04-08  81  70
## 4  2000   3 Doors Down                   Loser 4:24   2000-10-21  76  76
## 5  2000       504 Boyz           Wobble Wobble 3:35   2000-04-15  57  34
## 6  2000           98^0 Give Me Just One Nig... 3:24   2000-08-19  51  39
## 7  2000        A*Teens           Dancing Queen 3:44   2000-07-08  97  97
## 8  2000        Aaliyah           I Don't Wanna 4:15   2000-01-29  84  62
## 9  2000        Aaliyah               Try Again 4:03   2000-03-18  59  53
## 10 2000 Adams, Yolanda           Open My Heart 5:30   2000-08-26  76  76
##    wk3 wk4 wk5 wk6 wk7 wk8 wk9 wk10 wk11 wk12 wk13 wk14 wk15 wk16 wk17
## 1   72  77  87  94  99  NA  NA    NA    NA    NA    NA    NA    NA    NA
## 2   92  NA  NA  NA  NA  NA  NA    NA    NA    NA    NA    NA    NA    NA
## 3   68  67  66  57  54  53  51    51    51    51    47    44    38    28    22
## 4   72  69  67  65  55  59  62    61    61    59    61    66    72    76    75
## 5   25  17  17  31  36  49  53    57    64    70    75    76    78    85    92
## 6   34  26  26  19   2   2   3     6     7    22    29    36    47    67    66
## 7   96  95 100  NA  NA  NA  NA    NA    NA    NA    NA    NA    NA    NA    NA
## 8   51  41  38  35  35  38  38    36    37    37    38    49    61    63    62
## 9   38  28  21  18  16  14  12    10     9     8     6     1     2     2     2
## 10  74  69  68  67  61  58  57    59    66    68    61    67    59    63    67
##    wk18 wk19 wk20 wk21 wk22 wk23 wk24 wk25 wk26 wk27 wk28 wk29 wk30 wk31
## 1    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 2    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 3    18   18   14   12    7    6    6    6    5    5    4    4    4    4
## 4    67   73   70   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 5    96   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 6    84   93   94   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 7    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 8    67   83   86   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 9     2    3    4    5    5    6    9   13   14   16   23   22   33   36
## 10   71   79   89   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
##    wk32 wk33 wk34 wk35 wk36 wk37 wk38 wk39 wk40 wk41 wk42 wk43 wk44 wk45
## 1    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 2    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 3     3    3    3    4    5    5    9    9   15   14   13   14   16   17
## 4    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 5    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 6    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 7    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 8    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 9    43   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 10   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
##    wk46 wk47 wk48 wk49 wk50 wk51 wk52 wk53 wk54 wk55 wk56 wk57 wk58 wk59
## 1    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 2    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 3    21   22   24   28   33   42   42   49   NA   NA   NA   NA   NA   NA
```

```
## 4    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 5    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 6    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 7    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 8    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 9    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 10   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
##    wk60 wk61 wk62 wk63 wk64 wk65 wk66 wk67 wk68 wk69 wk70 wk71 wk72 wk73
## 1    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 2    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 3    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 4    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 5    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 6    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 7    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 8    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 9    NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
## 10   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA   NA
##    wk74 wk75 wk76
## 1    NA   NA   NA
## 2    NA   NA   NA
## 3    NA   NA   NA
## 4    NA   NA   NA
## 5    NA   NA   NA
## 6    NA   NA   NA
## 7    NA   NA   NA
## 8    NA   NA   NA
## 9    NA   NA   NA
## 10   NA   NA   NA
```

```
clean <- melt(raw, id = 1:5, na.rm = T)
clean$week <- as.integer(str_replace_all(clean$variable, "[^0-9]+", ""))
clean$variable <- NULL

clean$date.entered <- ymd(clean$date.entered)
clean$date <- clean$date.entered + weeks(clean$week - 1)
clean$date.entered <- NULL
clean <- rename(clean, c("value" = "rank"))
clean <- arrange(clean, year, artist, track, time, week)
clean <- clean[c("year", "artist", "time", "track", "date", "week", "rank")]

clean_out <- mutate(clean,
                    date = as.character(date))
head(clean_out,10)
```

```
##    year  artist time                    track       date week rank
## 1  2000   2 Pac 4:22           Baby Don't Cry 2000-02-26    1   87
## 2  2000   2 Pac 4:22           Baby Don't Cry 2000-03-04    2   82
## 3  2000   2 Pac 4:22           Baby Don't Cry 2000-03-11    3   72
## 4  2000   2 Pac 4:22           Baby Don't Cry 2000-03-18    4   77
## 5  2000   2 Pac 4:22           Baby Don't Cry 2000-03-25    5   87
## 6  2000   2 Pac 4:22           Baby Don't Cry 2000-04-01    6   94
## 7  2000   2 Pac 4:22           Baby Don't Cry 2000-04-08    7   99
## 8  2000 2Ge+her 3:15 The Hardest Part Of ... 2000-09-02    1   91
## 9  2000 2Ge+her 3:15 The Hardest Part Of ... 2000-09-09    2   87
```

```
## 10 2000 2Ge+her 3:15 The Hardest Part Of ... 2000-09-16    3   92
```