Reproducible Research: Peer Assessment 1

Step 1: Code for reading in the dataset and/or processing the data

```
## Load and preprocess the data
acty_data1 <- read.csv2(unz("activity.zip", "activity.csv"), header=TRUE,sep
=",")
acty_data1$steps <- as.numeric(acty_data1$steps)
acty_data1$date <- as.Date(acty_data1$date)
acty_data1 <- transform(acty_data1, date=factor(date), interval=factor(interva
l))
str(acty_data1)
```

```
## 'data.frame':    17568 obs. of  3 variables:
##  $ steps   : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ date    : Factor w/ 61 levels "2012-10-01","2012-10-02",..: 1 1 1 1 1 1
1 1 1 1 ...
##  $ interval: Factor w/ 288 levels "0","5","10","15",..: 1 2 3 4 5 6 7 8 9 1
0 ...
```

```
head(acty_data1)
```

```
##   steps       date interval
## 1    NA 2012-10-01        0
## 2    NA 2012-10-01        5
## 3    NA 2012-10-01       10
## 4    NA 2012-10-01       15
## 5    NA 2012-10-01       20
## 6    NA 2012-10-01       25
```

Step 2: Histogram of the total number of steps taken each day

```
## Summarize number of steps by date, excluding NA values
acty_data2 <- aggregate(x=acty_data1$steps, by=acty_data1[c("date")], FUN=sum,
na.rm=TRUE)
str(acty_data2)
```

```
## 'data.frame':    61 obs. of  2 variables:
##  $ date: Factor w/ 61 levels "2012-10-01","2012-10-02",..: 1 2 3 4 5 6 7 8
9 10 ...
##  $ x   : num  0 126 11352 12116 13294 ...
```

```
head(acty_data2)
```

```
##         date     x
## 1 2012-10-01     0
## 2 2012-10-02   126
## 3 2012-10-03 11352
## 4 2012-10-04 12116
## 5 2012-10-05 13294
## 6 2012-10-06 15420
```

```
## Histogram of the total number of steps taken each day
hist(acty_data2[,2], xlab="Total number of steps taken each day", main="Histogr
am of the total number of steps taken each day")
```

Step 3: Mean and median number of steps taken each day

```
## Calculate mean and median number of steps taken each day
library(doBy)
acty_data3 <- summaryBy(steps ~ date, data = acty_data1, FUN = list(mean, media
n), na.rm=TRUE)
str(acty_data3)
```

```
## 'data.frame':    61 obs. of  3 variables:
##  $ date        : Factor w/ 61 levels "2012-10-01","2012-10-02",..: 1 2 3 4
5 6 7 8 9 10 ...
##  $ steps.mean  : num  NaN 0.438 39.417 42.069 46.16 ...
##  $ steps.median: num  NA 0 0 0 0 0 0 NA 0 0 ...
```

```
head(acty_data3)
```

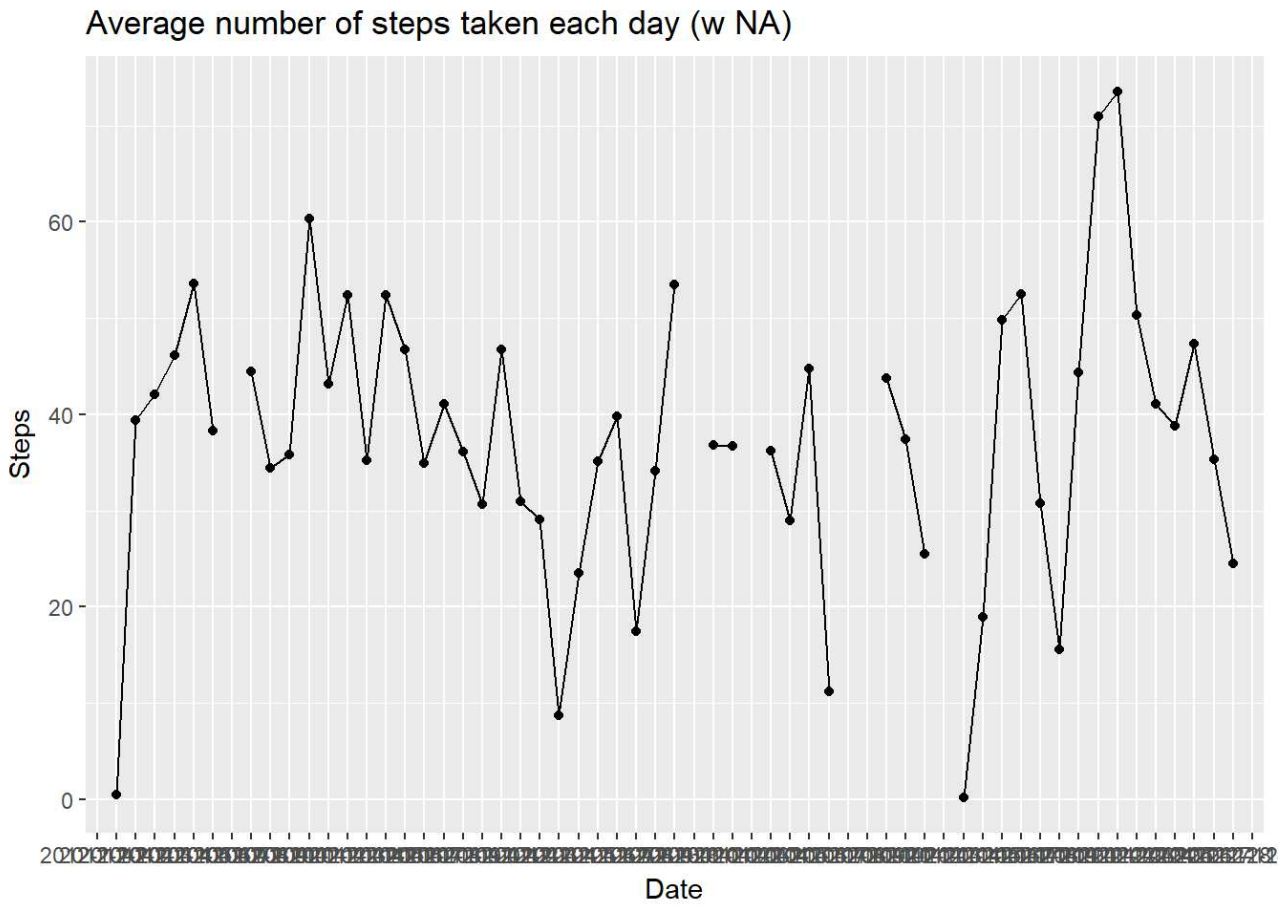
```
##         date steps.mean steps.median
## 1 2012-10-01        NaN           NA
## 2 2012-10-02    0.43750            0
## 3 2012-10-03   39.41667            0
## 4 2012-10-04   42.06944            0
## 5 2012-10-05   46.15972            0
## 6 2012-10-06   53.54167            0
```

Step 4: Time series plot of the average number of steps taken

```
## Plot of the average number of steps taken by date, including NA
acty_data3 <- transform(acty_data3, date=factor(date))
library(ggplot2)
ggplot(acty_data3, aes(date, steps.mean, group = 1)) + geom_point() + geom_line
() +
  labs(x = "Date", y = "Steps", title = "Average number of steps taken each da
y (w NA)")
```

```
## Warning: Removed 8 rows containing missing values (geom_point).
```

```
## Warning: Removed 2 rows containing missing values (geom_path).
```



Step 5: The 5-minute interval that, on average, contains the maximum number of steps

```
## Exclude NA rows
acty_data4 <- acty_data1[complete.cases(acty_data1),]
## Create numeric column for number of steps
max_step <- max(acty_data4$steps, na.rm=TRUE)
## Search for row with max steps
acty_data4[acty_data4$steps == max_step, ]
```

```
##       steps       date interval
## 16492   806 2012-11-27      615
```

```
## Here is an alternative approach using arrange function; might be more effici
ent
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
head(arrange(acty_data1, desc(steps)),1)
```

```
##   steps       date interval
## 1   806 2012-11-27      615
```

Step 6: Code to describe and show a strategy for imputing missing data

```
## Calculate and report the total number of missing values in the dataset
sum(is.na(acty_data1$steps))
```

```
## [1] 2304
```

```
## Imputing missing values.  For all the steps value as NA, set to 0
## This is no ideal solution
acty_data1$stepsImputed <- acty_data1$steps
acty_data1[is.na(acty_data1$steps),4] <- 0
str(acty_data1)
```

```
## 'data.frame':    17568 obs. of  4 variables:
##  $ steps       : num  NA NA NA NA NA NA NA NA NA NA ...
##  $ date        : Factor w/ 61 levels "2012-10-01","2012-10-02",..: 1 1 1 1
1 1 1 1 1 1 ...
##  $ interval    : Factor w/ 288 levels "0","5","10","15",..: 1 2 3 4 5 6 7 8
9 10 ...
##  $ stepsImputed: num  0 0 0 0 0 0 0 0 0 0 ...
```

```
head(acty_data1)
```

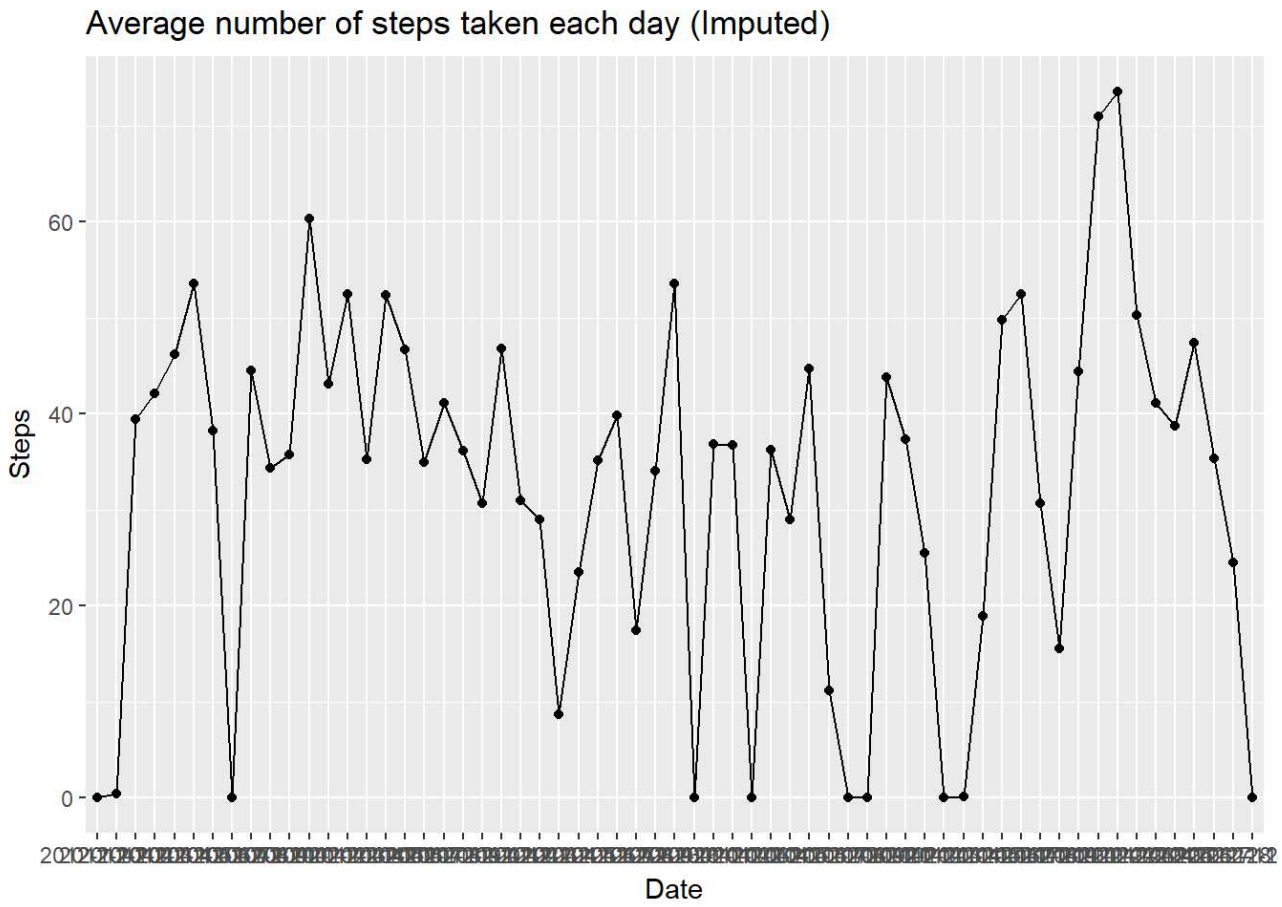
```
##   steps       date interval stepsImputed
## 1    NA 2012-10-01        0            0
## 2    NA 2012-10-01        5            0
## 3    NA 2012-10-01       10            0
## 4    NA 2012-10-01       15            0
## 5    NA 2012-10-01       20            0
## 6    NA 2012-10-01       25            0
```

```
sum(is.na(acty_data1$stepsImputed))
```

```
## [1] 0
```

Step 7: Histogram of the total number of steps taken each day after missing values are imputed

```
## Plot of the average number of steps taken by date, excluding NA
acty_data3A <- summaryBy(stepsImputed ~ date, data = acty_data1, FUN = list(mea
n, median), na.rm=TRUE)
acty_data3A <- transform(acty_data3A, date=factor(date))
ggplot(acty_data3A, aes(date, stepsImputed.mean, group = 1)) + geom_point() + g
eom_line() +
  labs(x = "Date", y = "Steps", title = "Average number of steps taken each da
y (Imputed)")
```



Step 8: Panel plot comparing the average number of steps taken per 5-minute interval across weekdays and weekends

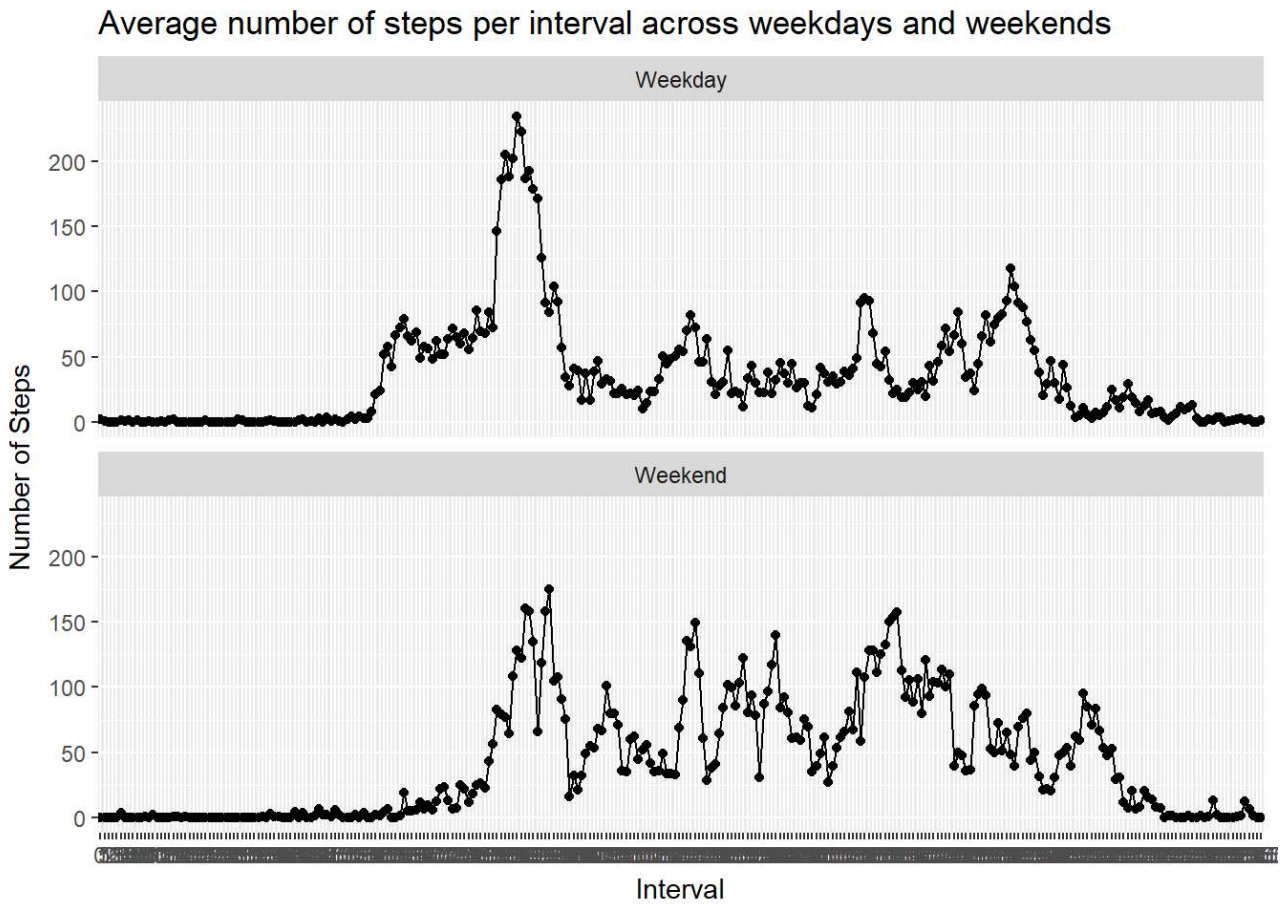
```
## Calculate weekday_type column based on date
acty_data1$weekday <- weekdays(as.Date(acty_data1$date))
acty_data1$weekday_type <- sapply(acty_data1$weekday, switch,
                                  Monday ='Weekday', Tuesday ='Weekday', Wednes
day ='Weekday',
                                  Thursday ='Weekday', Friday = 'Weekday', Satu
rday = 'Weekend',
                                  Sunday = 'Weekend')
acty_data1 <- transform(acty_data1, weekday_type=factor(weekday_type), interval
=factor(interval))
## Summarize average number of steps by weekday_type and interval, excluding N
A values
acty_data5 <- aggregate(x=acty_data1[1], by=acty_data1[c("weekday_type","interv
al")], FUN=mean, na.rm=TRUE)
str(acty_data5)
```

```
## 'data.frame':    576 obs. of  3 variables:
##  $ weekday_type: Factor w/ 2 levels "Weekday","Weekend": 1 2 1 2 1 2 1 2 1
2 ...
##  $ interval    : Factor w/ 288 levels "0","5","10","15",..: 1 1 2 2 3 3 4 4
5 5 ...
##  $ steps       : num  2.333 0 0.462 0 0.179 ...
```

```
head(acty_data5)
```

```
##   weekday_type interval     steps
## 1      Weekday        0 2.3333333
## 2      Weekend        0 0.0000000
## 3      Weekday        5 0.4615385
## 4      Weekend        5 0.0000000
## 5      Weekday       10 0.1794872
## 6      Weekend       10 0.0000000
```

```
library(ggplot2)
ggplot(acty_data5, aes(interval, steps, group = 1)) +
  geom_point() + geom_line() + facet_wrap(~weekday_type, ncol=1) +
  labs(x = "Interval", y = "Number of Steps",
       title = "Average number of steps per interval across weekdays and weeken
ds")
```


Average number of steps per interval across weekdays and weekends
Weekday
Weekend
Number of Steps
0
50
100
150
200
Interval