HW1

GENERAL INSTRUCTIONS:

- For all ggplots, make sure you make changes so that the data viz is effective, clear, and does not contain distracting elements, graphs will be graded both on correctness (did you plot the right hting) as well as on effectiveness (does this graph thoughtfully demonstrate the principles we learned in our data viz lectures).
- CLEARLY mark where you are answering each question (see here for an example format).
- Show all code necessary for the analysis, but remove superfluous code

Using the dataset linked here, build a linear regression model to predict *reaction time* from a lab based cognitive task (reaction time refers to the amount of time it takes a person to react after seeing a stimuli on a screen) based on all the other variables.

Variables

- age: age in years
- boredom_rating: a scale of 0-100 with 0 being completely not bored, 100 is completely bored
- risk_propensity: a scale of 0-28 where higher scored indicate a person is more likely to take risks
- height: height in cm
- left_handed: 0 if the person is right handed, 1 if they are left handed
- reaction_time: reaction time in ms

Instructions

Feel free to add cells to this notebook in order to execute the code, but for parts b,c, and d, make sure you put the discussion part in a *Markdown* cell, do not use code comments to answer.

```python
# import necessary packages
import warnings
warnings.filterwarnings('ignore')

import pandas as pd
import numpy as np
from plotnine import *
import statsmodels.api as sm

from sklearn.linear_model import LinearRegression # Linear Regression Model
from sklearn.preprocessing import StandardScaler #Z-score variables
from sklearn.metrics import mean_squared_error, mean_absolute_error,
```

```
r2_score, accuracy_score #model evaluation

from sklearn.model_selection import train_test_split # simple TT split
cv
from sklearn.model_selection import KFold # k-fold cv
from sklearn.model_selection import LeaveOneOut #LOO cv
from sklearn.model_selection import cross_val_score # cross validation
metrics
from sklearn.model_selection import cross_val_predict # cross
validation metrics
```

A
```
# code for a
reaction =
pd.read_csv("https://raw.githubusercontent.com/cmparlettpelleriti/
CPSC392ParlettPelleriti/master/Data/reactionTime.csv")


predictors =
["age","boredom_rating","risk_propensity","height","left_handed"]
contin = ["age","boredom_rating","risk_propensity","height"]

X_train, X_test, y_train, y_test =
train_test_split(reaction[predictors], reaction["reaction_time"],
test_size=0.2)

z = StandardScaler()


X_train[contin] = z.fit_transform(X_train[contin])
X_test[contin] = z.transform(X_test[contin])

lr = LinearRegression()

lr.fit(X_train, y_train)


LinearRegression()
```
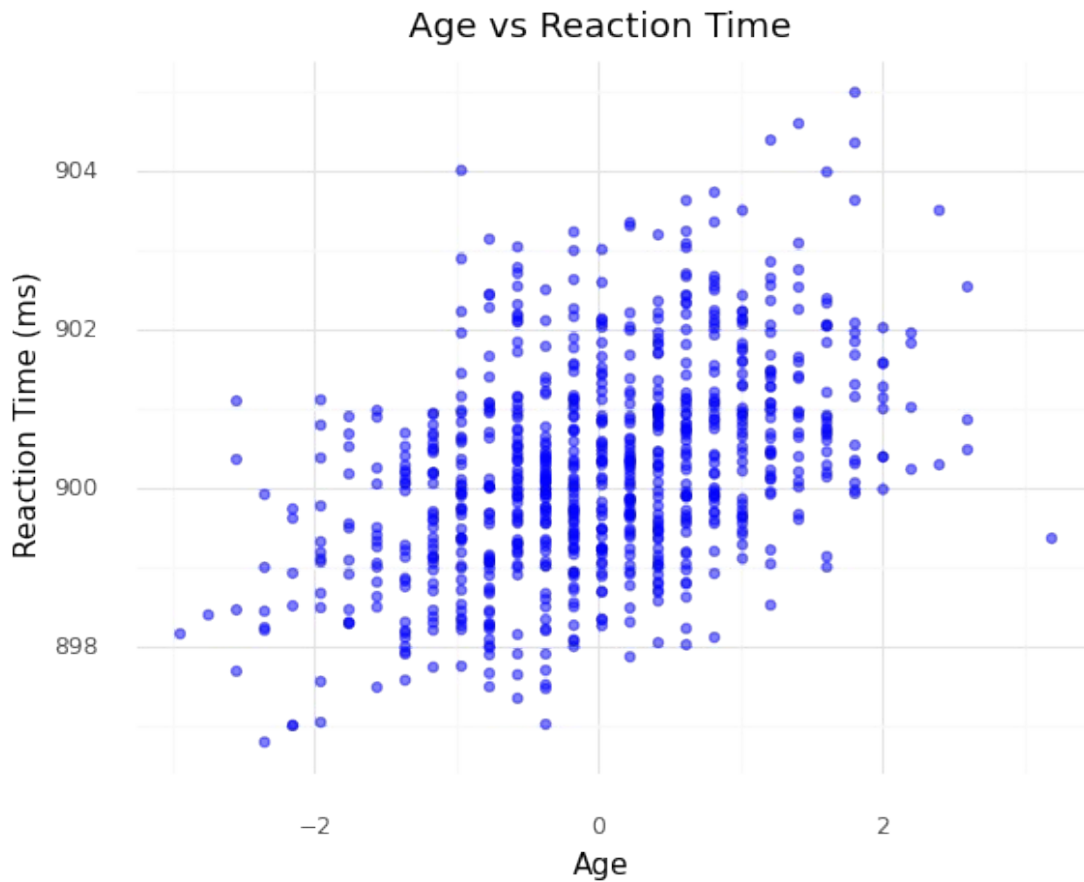
B
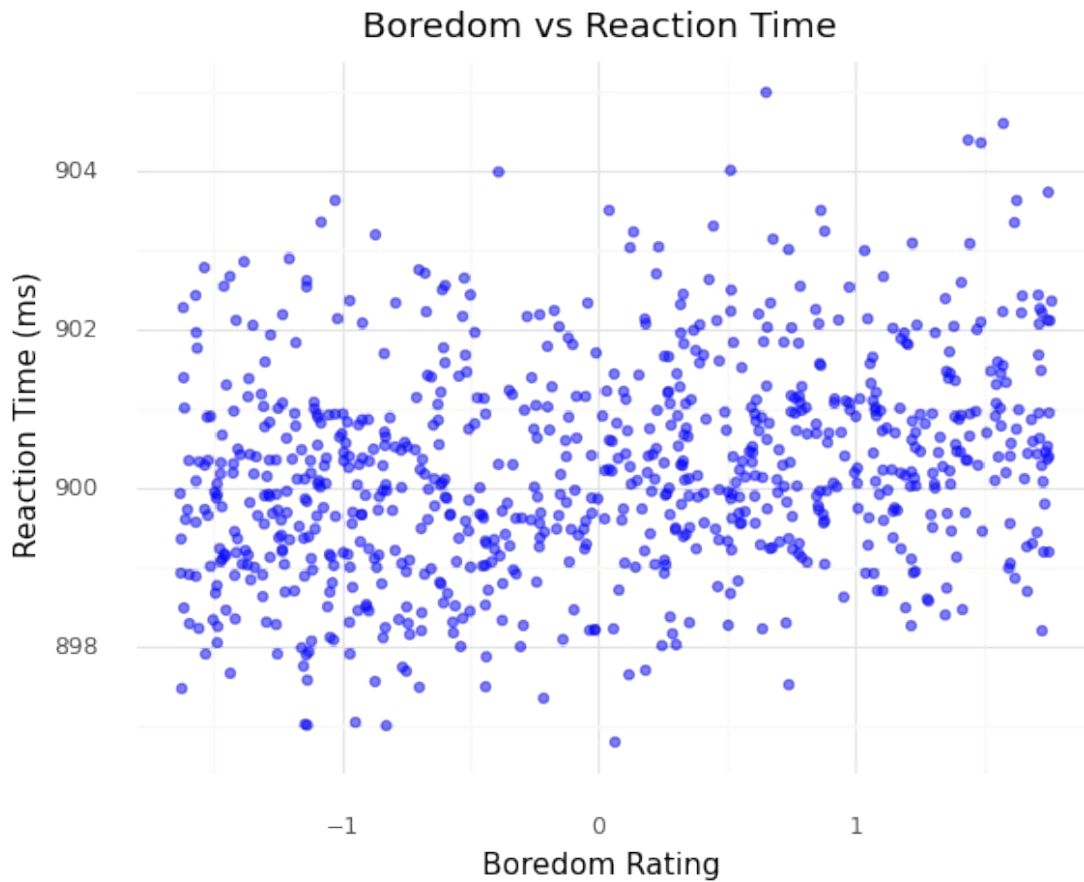```
traindata = pd.concat([X_train, y_train], axis = 1)

(ggplot(traindata, aes(x = "age", y = "reaction_time")) +
geom_point(color = "blue", alpha = 0.5) + theme_minimal() +
xlab("Age") + ylab("Reaction Time (ms)") + ggtitle("Age vs Reaction
Time"))
```

Age vs Reaction Time

```
<ggplot: (8732198997829)>

(ggplot(traindata, aes(x = "boredom_rating", y = "reaction_time")) +
geom_point(color = "blue", alpha = 0.5) + theme_minimal() +
xlab("Boredom Rating") + ylab("Reaction Time (ms)") + ggtitle("Boredom
vs Reaction Time"))
```
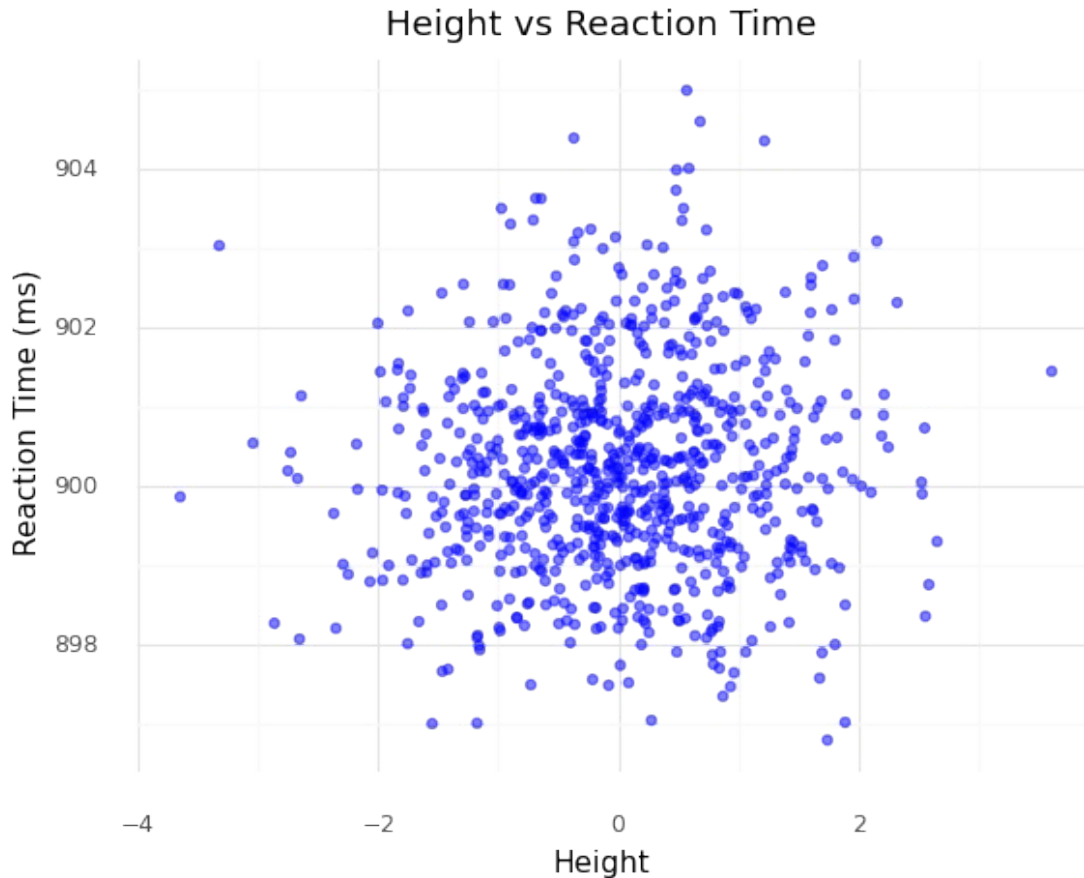
## Boredom vs Reaction Time



```
<ggplot: (8732195769341)>

(ggplot(traindata, aes(x = "risk_propensity", y = "reaction_time")) +
geom_point(color = "blue", alpha = 0.5) + theme_minimal() + xlab("Risk
Propensity") + ylab("Reaction Time (ms)") + ggtitle("Risk Propensity
vs Reaction Time"))
```

Risk Propensity vs Reaction Time


```
<ggplot: (8732195697461)>

(ggplot(traindata, aes(x = "height", y = "reaction_time")) +
geom_point(color = "blue", alpha = 0.5) + theme_minimal() +
xlab("Height") + ylab("Reaction Time (ms)") + ggtitle("Height vs
Reaction Time"))
```

Height vs Reaction Time


```
<ggplot: (8732198757781)>
```

All of these graphs display the relation between each predictor variable and reaction time. It is important to check for at least somewhat of a linear relationship in all these graphs. The way to check is to see if there is a trend of a constant rate of change as the x value increases. Each graph uses a different predictor variable for the x-axis. Age appears to have a strong positive linear relationship with reaction time. Boredom appears to have a weak positive linear relationship. Risk propensity seems to have a decent negative linear relationship. Height is quite a bit more difficult to determine. It is not perfectly clear as to whether or not this relationship is linear, however it does seem to possiblt have a slight positive linear relationship. With all of these interpretations, we can infer that this dataset could be modeled through linear regression and does in fact pass the linearity assumption.
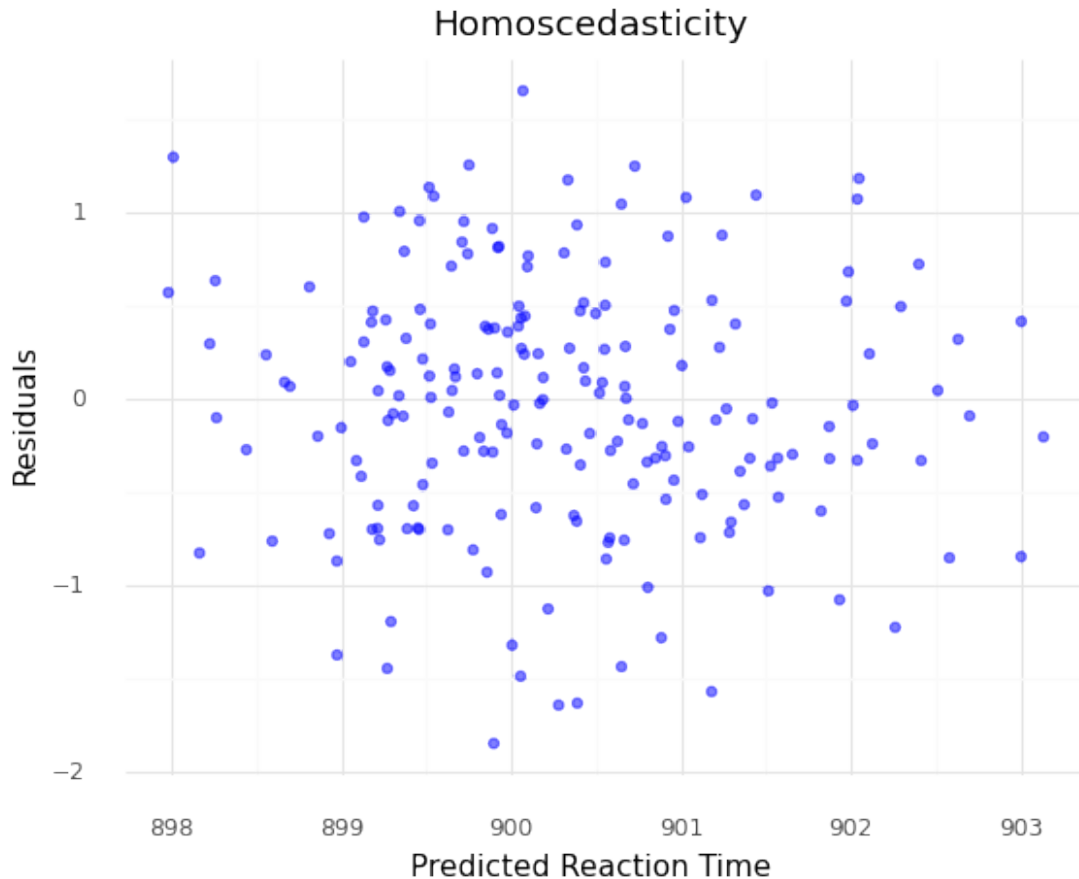
C

```
predicted = lr.predict(X_test)
residuals = y_test - predicted

assump = pd.DataFrame({"residual":residuals,"predicted":predicted})

(ggplot(assump, aes(x = "predicted", y = "residual")) +
geom_point(color = "blue", alpha = 0.5)  + theme_minimal() +
```

```
xlab("Predicted Reaction Time") + ylab("Residuals") +
ggtitle("Homoscedasticity"))
```


Homoscedasticity
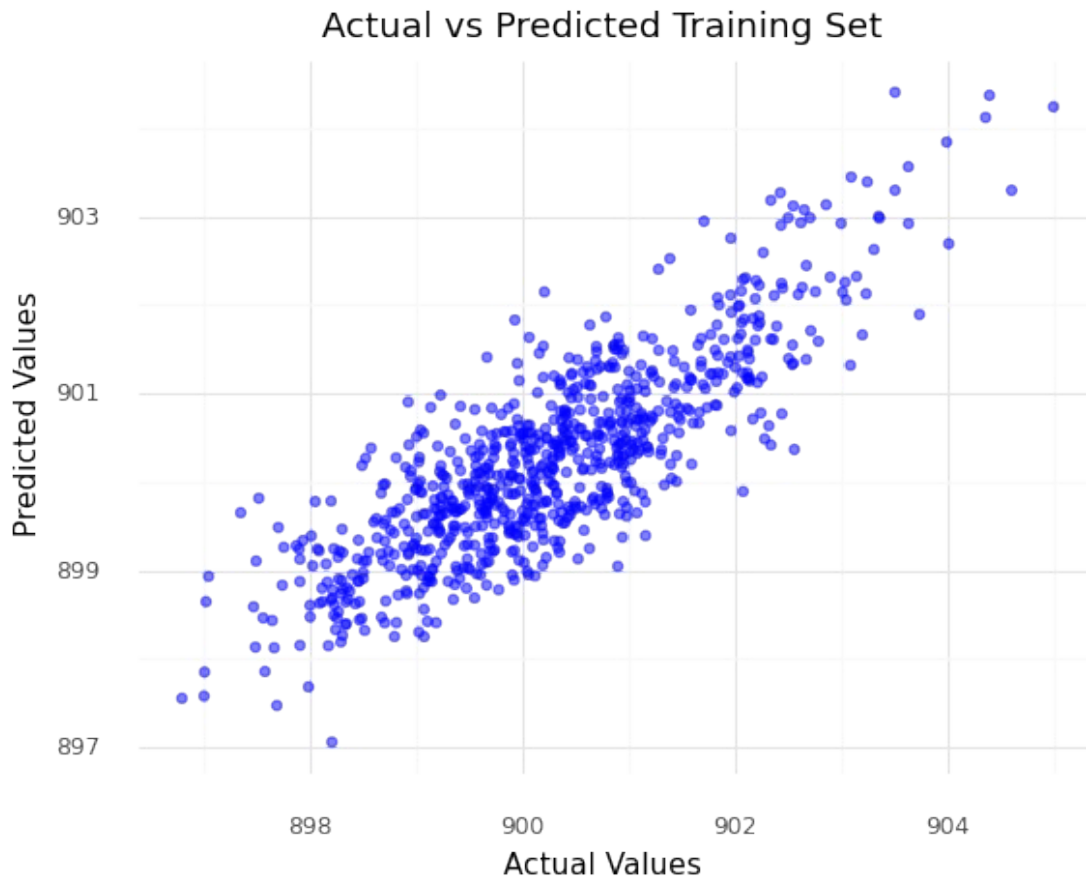
```
<ggplot: (8732195858597)>
```

This graph displays the predicted reaction time (ms) on the x-axis and Residuals on the y-axis. This helps to determine whether the assumption of homoscedasticity is passed. As you can see on this graph, the error remains somewhat constant throughout all ranges of x values. There is no convergence or divergence which would indicate heteroscedasticity. The error does not get exaggerated in certain ranges of x values. This means that the model is effective and the assumption of homoscedasticity is valid.

D

```
trainpred = lr.predict(X_train)

acvpredtrain = pd.DataFrame({"actual":y_train, "pred":trainpred})

(ggplot(acvpredtrain, aes(x = "actual", y = "pred")) +
geom_point(color = "blue", alpha = 0.5)  + theme_minimal() +
xlab("Actual Values") + ylab("Predicted Values") + ggtitle("Actual vs
Predicted Training Set"))
```

Actual vs Predicted Training Set


```
<ggplot: (8732195800149)>
```

```
maetrain = mean_absolute_error(y_train, lr.predict(X_train))
print(maetrain)
```

```
0.5816780827257577
```
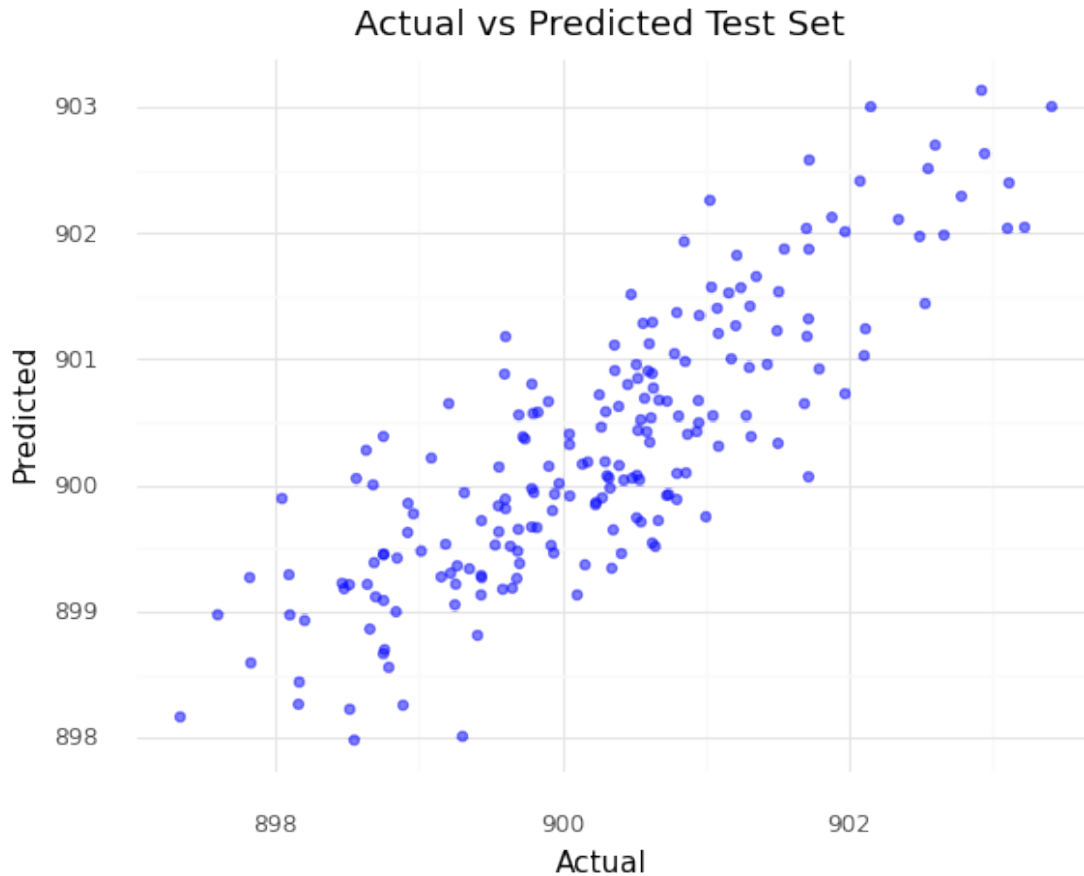
```
r2train = r2_score(y_train, lr.predict(X_train))
print(r2train)
```

```
0.699063140708865
```

```
acvpredtest = pd.DataFrame({"actual":y_test, "pred":predicted})
```

```
(ggplot(acvpredtest, aes(x = "actual", y = "pred")) + geom_point(color
= "blue", alpha = 0.5)  + theme_minimal() + xlab("Actual") +
ylab("Predicted") + ggtitle("Actual vs Predicted Test Set"))
```

Actual vs Predicted Test Set


```
<ggplot: (8732195743817)>
```

```
maetest = mean_absolute_error(y_test, lr.predict(X_test))
print(maetest)
```

```
0.5320974306750919
```

```
r2test = r2_score(y_test, lr.predict(X_test))
print(r2test)
```

```
0.7003787023967193
```

These graphs and data would indicate that this model is pretty effective at predicting the reaction time in this data set. The testing data set has a mean absolute error of about 0.53 while the r squared value is about 0.7. The closer the r squared value is to 1, the more accurate the model is. An r squared value of 0.7 indicates that the model is decently accurate at predicing reaction time from the predictor varibales. The mean absolute error value in my opinion is low enough to consider this model accurate, since a difference of 0.53 ms doesn't cause a huge amount of variance from the actual data.
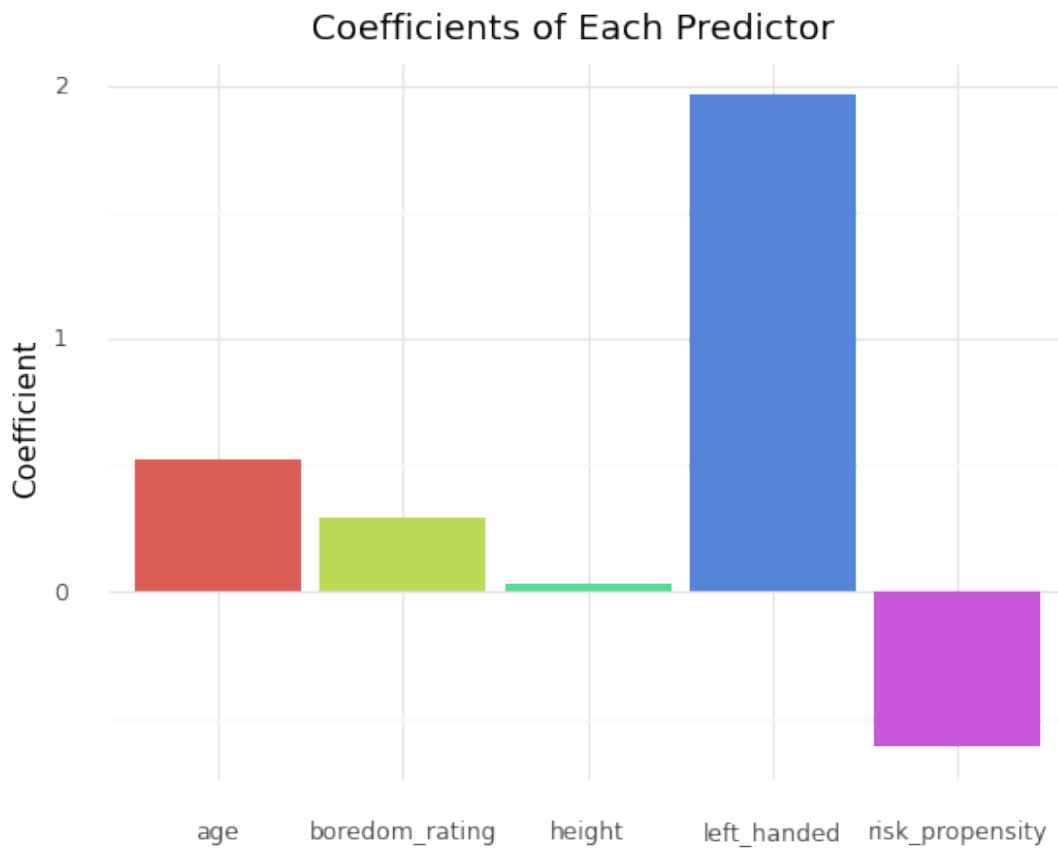
E

The r squared and mean absolute error values for both the training and testing data sets would indicate that the model is not overfit. There is a very miniscule difference between the r squared values, meaning that using r squared as a metric, the model has the same accuracy on both testing and training data. However, the mean absolute error values show about a 0.05 difference. Also, the mean absolute error value for the testing data is lower than that of the training data. This would indicate that model has less error in predicting values with the test set. In order for this data to be overfit, the mean absolute error value for the training data would have to be significantly lower than that of the testing set and the r squared value would have to be much higher than that of the testing set.

F

```
coef = pd.DataFrame({"Coef": lr.coef_, "Names": predictors})
```

```
(ggplot(coef, aes(x = "Names", y = "Coef", fill = "Names")) +
geom_bar(stat = "identity") + theme_minimal() + theme_minimal() +
xlab("") + ylab("Coefficient") + ggtitle("Coefficients of Each
Predictor") + theme(legend_position = "none"))
```

```
<ggplot: (8732198724597)>
```

```
coef.head()
```

```
        Coef              Names
0   0.524683                age
1   0.296461    boredom_rating
2  -0.613970    risk_propensity
3   0.036236             height
4   1.962168        left_handed
```

The coefficient of 0.52 for age means for every 1 standard deviation difference in age, reaction time increases by 0.52 in ms.

The coefficient of 0.3 for boredom rating means for every 1 standard deviation difference in boredom rating, reaction time increases by 0.3 in ms.

The coefficient of -0.61 for risk propensity means for every 1 standard deviation difference in risk propensity, reaction time decreases by 0.61 in ms.

The coefficient of 0.04 for height means for every 1 standard deviation difference in height, reaction time increases by 0.04 in ms.

The coefficient of 01.96 for left handed means when an individual is left handed, their reaction time increases by 1.96 in ms.

```
# doesn't show this cells output when downloading PDF
!pip install gwpy &> /dev/null
```

```
# installing necessary files
!apt-get install texlive texlive-xetex texlive-latex-extra pandoc
!sudo apt-get update
!sudo apt-get install texlive-xetex texlive-fonts-recommended texlive-
plain-generic
```

```
# installing pypandoc
!pip install pypandoc
```

```
# connecting your google drive
from google.colab import drive
drive.mount('/content/drive')
```

```
# copying your file over. Change "Class6-Completed.ipynb" to whatever
your file is called (see top of notebook)
!cp "drive/My Drive/Colab Notebooks/Copy of HW1_SP22.ipynb" ./
```

```
# Again, replace "Class6-Completed.ipynb" to whatever your file is
called (see top of notebook)
!jupyter nbconvert --to PDF "Copy of HW1_SP22.ipynb"
```

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
pandoc is already the newest version (1.19.2.4~dfsg-1build4).
pandoc set to manually installed.
The following package was automatically installed and is no longer
required:
  libnvidia-common-470
Use 'apt autoremove' to remove it.
The following additional packages will be installed:
  fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-
texgyre
  javascript-common libcupsfilters1 libcupsimage2 libgs9 libgs9-common
  libijs-0.35 libjbig2dec0 libjs-jquery libkpathsea6 libpotrace0
libptexenc1
  libruby2.5 libsynctex1 libtexlua52 libtexluajit2 libzzip-0-13
lmodern
  poppler-data preview-latex-style rake ruby ruby-did-you-mean ruby-
minitest
  ruby-net-telnet ruby-power-assert ruby-test-unit ruby2.5
  rubygems-integration t1utils tex-common tex-gyre texlive-base
  texlive-binaries texlive-fonts-recommended texlive-latex-base
  texlive-latex-recommended texlive-pictures texlive-plain-generic
tipa
Suggested packages:
  fonts-noto apache2 | lighttpd | httpd poppler-utils ghostscript
  fonts-japanese-mincho | fonts-ipafont-mincho fonts-japanese-gothic
  | fonts-ipafont-gothic fonts-arphic-ukai fonts-arphic-uming fonts-
nanum ri
  ruby-dev bundler debhelper gv | postscript-viewer perl-tk xpdf-
reader
  | pdf-viewer texlive-fonts-recommended-doc texlive-latex-base-doc
  python-pygments icc-profiles libfile-which-perl
  libspreadsheet-parseexcel-perl texlive-latex-extra-doc
  texlive-latex-recommended-doc texlive-pstricks dot2tex prerex ruby-
tcltk
  | libtcltk-ruby texlive-pictures-doc vprerex
The following NEW packages will be installed:
  fonts-droid-fallback fonts-lato fonts-lmodern fonts-noto-mono fonts-
texgyre
  javascript-common libcupsfilters1 libcupsimage2 libgs9 libgs9-common
  libijs-0.35 libjbig2dec0 libjs-jquery libkpathsea6 libpotrace0
libptexenc1
  libruby2.5 libsynctex1 libtexlua52 libtexluajit2 libzzip-0-13
lmodern
  poppler-data preview-latex-style rake ruby ruby-did-you-mean ruby-
minitest
  ruby-net-telnet ruby-power-assert ruby-test-unit ruby2.5
  rubygems-integration t1utils tex-common tex-gyre texlive texlive-
base
```

```
  texlive-binaries texlive-fonts-recommended texlive-latex-base
  texlive-latex-extra texlive-latex-recommended texlive-pictures
  texlive-plain-generic texlive-xetex tipa
0 upgraded, 47 newly installed, 0 to remove and 39 not upgraded.
Need to get 146 MB of archives.
After this operation, 460 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-droid-
fallback all 1:6.0.1r16-1.1 [1,805 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-lato
all 2.0-2 [2,698 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/main amd64 poppler-data
all 0.4.8-2 [1,479 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic/main amd64 tex-common
all 6.09 [33.0 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-lmodern
all 2.004.5-3 [4,551 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-noto-
mono all 20171026-2 [75.5 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/universe amd64 fonts-
texgyre all 20160520-1 [8,761 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/main amd64 javascript-
common all 11 [6,066 B]
Get:9 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libcupsfilters1 amd64 1.20.2-0ubuntu3.1 [108 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libcupsimage2 amd64 2.2.7-1ubuntu2.8 [18.6 kB]
Get:11 http://archive.ubuntu.com/ubuntu bionic/main amd64 libijs-0.35
amd64 0.35-13 [15.5 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic/main amd64 libjbig2dec0
amd64 0.13-6 [55.9 kB]
Get:13 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libgs9-common all 9.26~dfsg+0-0ubuntu0.18.04.15 [5,092 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libgs9 amd64 9.26~dfsg+0-0ubuntu0.18.04.15 [2,265 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic/main amd64 libjs-jquery
all 3.2.1-1 [152 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libkpathsea6 amd64 2017.20170613.44572-8ubuntu0.1 [54.9 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic/main amd64 libpotrace0
amd64 1.14-2 [17.4 kB]
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
libptexenc1 amd64 2017.20170613.44572-8ubuntu0.1 [34.5 kB]
Get:19 http://archive.ubuntu.com/ubuntu bionic/main amd64 rubygems-
integration all 1.11 [4,994 B]
Get:20 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
ruby2.5 amd64 2.5.1-1ubuntu1.11 [48.6 kB]
Get:21 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby amd64
1:2.5.1 [5,712 B]
Get:22 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 rake
all 12.3.1-1ubuntu0.1 [44.9 kB]
```

Get:23 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-did-you-mean all 1.2.0-2 [9,700 B]
Get:24 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-minitest all 5.10.3-1 [38.6 kB]
Get:25 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-net-telnet all 0.1.1-2 [12.6 kB]
Get:26 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-power-assert all 0.3.0-1 [7,952 B]
Get:27 http://archive.ubuntu.com/ubuntu bionic/main amd64 ruby-test-unit all 3.2.5-1 [61.1 kB]
Get:28 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libruby2.5 amd64 2.5.1-1ubuntu1.11 [3,072 kB]
Get:29 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libsynctex1 amd64 2017.20170613.44572-8ubuntu0.1 [41.4 kB]
Get:30 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtexlua52 amd64 2017.20170613.44572-8ubuntu0.1 [91.2 kB]
Get:31 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtexluajit2 amd64 2017.20170613.44572-8ubuntu0.1 [230 kB]
Get:32 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libzzip-0-13 amd64 0.13.62-3.1ubuntu0.18.04.1 [26.0 kB]
Get:33 http://archive.ubuntu.com/ubuntu bionic/main amd64 lmodern all 2.004.5-3 [9,631 kB]
Get:34 http://archive.ubuntu.com/ubuntu bionic/main amd64 preview-latex-style all 11.91-1ubuntu1 [185 kB]
Get:35 http://archive.ubuntu.com/ubuntu bionic/main amd64 t1utils amd64 1.41-2 [56.0 kB]
Get:36 http://archive.ubuntu.com/ubuntu bionic/universe amd64 tex-gyre all 20160520-1 [4,998 kB]
Get:37 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 texlive-binaries amd64 2017.20170613.44572-8ubuntu0.1 [8,179 kB]
Get:38 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-base all 2017.20180305-1 [18.7 MB]
Get:39 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-fonts-recommended all 2017.20180305-1 [5,262 kB]
Get:40 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-latex-base all 2017.20180305-1 [951 kB]
Get:41 http://archive.ubuntu.com/ubuntu bionic/main amd64 texlive-latex-recommended all 2017.20180305-1 [14.9 MB]
Get:42 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive all 2017.20180305-1 [14.4 kB]
Get:43 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-pictures all 2017.20180305-1 [4,026 kB]
Get:44 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-latex-extra all 2017.20180305-2 [10.6 MB]
Get:45 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-plain-generic all 2017.20180305-2 [23.6 MB]
Get:46 http://archive.ubuntu.com/ubuntu bionic/universe amd64 tipa all 2:1.3-20 [2,978 kB]
Get:47 http://archive.ubuntu.com/ubuntu bionic/universe amd64 texlive-xetex all 2017.20180305-1 [10.7 MB]

```
Fetched 146 MB in 9s (16.6 MB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
Selecting previously unselected package fonts-droid-fallback.
(Reading database ... 155320 files and directories currently
installed.)
Preparing to unpack .../00-fonts-droid-fallback_1%3a6.0.1r16-
1.1_all.deb ...
Unpacking fonts-droid-fallback (1:6.0.1r16-1.1) ...
Selecting previously unselected package fonts-lato.
Preparing to unpack .../01-fonts-lato_2.0-2_all.deb ...
Unpacking fonts-lato (2.0-2) ...
Selecting previously unselected package poppler-data.
Preparing to unpack .../02-poppler-data_0.4.8-2_all.deb ...
Unpacking poppler-data (0.4.8-2) ...
Selecting previously unselected package tex-common.
Preparing to unpack .../03-tex-common_6.09_all.deb ...
Unpacking tex-common (6.09) ...
Selecting previously unselected package fonts-lmodern.
Preparing to unpack .../04-fonts-lmodern_2.004.5-3_all.deb ...
Unpacking fonts-lmodern (2.004.5-3) ...
Selecting previously unselected package fonts-noto-mono.
Preparing to unpack .../05-fonts-noto-mono_20171026-2_all.deb ...
Unpacking fonts-noto-mono (20171026-2) ...
Selecting previously unselected package fonts-texgyre.
Preparing to unpack .../06-fonts-texgyre_20160520-1_all.deb ...
Unpacking fonts-texgyre (20160520-1) ...
Selecting previously unselected package javascript-common.
Preparing to unpack .../07-javascript-common_11_all.deb ...
Unpacking javascript-common (11) ...
Selecting previously unselected package libcupsfilters1:amd64.
Preparing to unpack .../08-libcupsfilters1_1.20.2-0ubuntu3.1_amd64.deb
...
Unpacking libcupsfilters1:amd64 (1.20.2-0ubuntu3.1) ...
Selecting previously unselected package libcupsimage2:amd64.
Preparing to unpack .../09-libcupsimage2_2.2.7-
1ubuntu2.8_amd64.deb ...
Unpacking libcupsimage2:amd64 (2.2.7-1ubuntu2.8) ...
Selecting previously unselected package libijs-0.35:amd64.
Preparing to unpack .../10-libijs-0.35_0.35-13_amd64.deb ...
Unpacking libijs-0.35:amd64 (0.35-13) ...
Selecting previously unselected package libjbig2dec0:amd64.
Preparing to unpack .../11-libjbig2dec0_0.13-6_amd64.deb ...
Unpacking libjbig2dec0:amd64 (0.13-6) ...
Selecting previously unselected package libgs9-common.
Preparing to unpack .../12-libgs9-common_9.26~dfsg+0-
0ubuntu0.18.04.15_all.deb ...
Unpacking libgs9-common (9.26~dfsg+0-0ubuntu0.18.04.15) ...
Selecting previously unselected package libgs9:amd64.
Preparing to unpack .../13-libgs9_9.26~dfsg+0-
```

0ubuntu0.18.04.15_amd64.deb ...
Unpacking libgs9:amd64 (9.26~dfsg+0-0ubuntu0.18.04.15) ...
Selecting previously unselected package libjs-jquery.
Preparing to unpack .../14-libjs-jquery_3.2.1-1_all.deb ...
Unpacking libjs-jquery (3.2.1-1) ...
Selecting previously unselected package libkpathsea6:amd64.
Preparing to unpack .../15-libkpathsea6_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking libkpathsea6:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libpotrace0.
Preparing to unpack .../16-libpotrace0_1.14-2_amd64.deb ...
Unpacking libpotrace0 (1.14-2) ...
Selecting previously unselected package libptexenc1:amd64.
Preparing to unpack .../17-libptexenc1_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking libptexenc1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package rubygems-integration.
Preparing to unpack .../18-rubygems-integration_1.11_all.deb ...
Unpacking rubygems-integration (1.11) ...
Selecting previously unselected package ruby2.5.
Preparing to unpack .../19-ruby2.5_2.5.1-1ubuntu1.11_amd64.deb ...
Unpacking ruby2.5 (2.5.1-1ubuntu1.11) ...
Selecting previously unselected package ruby.
Preparing to unpack .../20-ruby_1%3a2.5.1_amd64.deb ...
Unpacking ruby (1:2.5.1) ...
Selecting previously unselected package rake.
Preparing to unpack .../21-rake_12.3.1-1ubuntu0.1_all.deb ...
Unpacking rake (12.3.1-1ubuntu0.1) ...
Selecting previously unselected package ruby-did-you-mean.
Preparing to unpack .../22-ruby-did-you-mean_1.2.0-2_all.deb ...
Unpacking ruby-did-you-mean (1.2.0-2) ...
Selecting previously unselected package ruby-minitest.
Preparing to unpack .../23-ruby-minitest_5.10.3-1_all.deb ...
Unpacking ruby-minitest (5.10.3-1) ...
Selecting previously unselected package ruby-net-telnet.
Preparing to unpack .../24-ruby-net-telnet_0.1.1-2_all.deb ...
Unpacking ruby-net-telnet (0.1.1-2) ...
Selecting previously unselected package ruby-power-assert.
Preparing to unpack .../25-ruby-power-assert_0.3.0-1_all.deb ...
Unpacking ruby-power-assert (0.3.0-1) ...
Selecting previously unselected package ruby-test-unit.
Preparing to unpack .../26-ruby-test-unit_3.2.5-1_all.deb ...
Unpacking ruby-test-unit (3.2.5-1) ...
Selecting previously unselected package libruby2.5:amd64.
Preparing to unpack .../27-libruby2.5_2.5.1-1ubuntu1.11_amd64.deb ...
Unpacking libruby2.5:amd64 (2.5.1-1ubuntu1.11) ...
Selecting previously unselected package libsynctex1:amd64.
Preparing to unpack .../28-libsynctex1_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking libsynctex1:amd64 (2017.20170613.44572-8ubuntu0.1) ...

Selecting previously unselected package libtexlua52:amd64.
Preparing to unpack .../29-libtexlua52_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking libtexlua52:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libtexluajit2:amd64.
Preparing to unpack .../30-libtexluajit2_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking libtexluajit2:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package libzzip-0-13:amd64.
Preparing to unpack .../31-libzzip-0-13_0.13.62-
3.1ubuntu0.18.04.1_amd64.deb ...
Unpacking libzzip-0-13:amd64 (0.13.62-3.1ubuntu0.18.04.1) ...
Selecting previously unselected package lmodern.
Preparing to unpack .../32-lmodern_2.004.5-3_all.deb ...
Unpacking lmodern (2.004.5-3) ...
Selecting previously unselected package preview-latex-style.
Preparing to unpack .../33-preview-latex-style_11.91-
1ubuntu1_all.deb ...
Unpacking preview-latex-style (11.91-1ubuntu1) ...
Selecting previously unselected package t1utils.
Preparing to unpack .../34-t1utils_1.41-2_amd64.deb ...
Unpacking t1utils (1.41-2) ...
Selecting previously unselected package tex-gyre.
Preparing to unpack .../35-tex-gyre_20160520-1_all.deb ...
Unpacking tex-gyre (20160520-1) ...
Selecting previously unselected package texlive-binaries.
Preparing to unpack .../36-texlive-binaries_2017.20170613.44572-
8ubuntu0.1_amd64.deb ...
Unpacking texlive-binaries (2017.20170613.44572-8ubuntu0.1) ...
Selecting previously unselected package texlive-base.
Preparing to unpack .../37-texlive-base_2017.20180305-1_all.deb ...
Unpacking texlive-base (2017.20180305-1) ...
Selecting previously unselected package texlive-fonts-recommended.
Preparing to unpack .../38-texlive-fonts-recommended_2017.20180305-
1_all.deb ...
Unpacking texlive-fonts-recommended (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-base.
Preparing to unpack .../39-texlive-latex-base_2017.20180305-
1_all.deb ...
Unpacking texlive-latex-base (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-recommended.
Preparing to unpack .../40-texlive-latex-recommended_2017.20180305-
1_all.deb ...
Unpacking texlive-latex-recommended (2017.20180305-1) ...
Selecting previously unselected package texlive.
Preparing to unpack .../41-texlive_2017.20180305-1_all.deb ...
Unpacking texlive (2017.20180305-1) ...
Selecting previously unselected package texlive-pictures.
Preparing to unpack .../42-texlive-pictures_2017.20180305-
1_all.deb ...

```
Unpacking texlive-pictures (2017.20180305-1) ...
Selecting previously unselected package texlive-latex-extra.
Preparing to unpack .../43-texlive-latex-extra_2017.20180305-2_all.deb
...
Unpacking texlive-latex-extra (2017.20180305-2) ...
Selecting previously unselected package texlive-plain-generic.
Preparing to unpack .../44-texlive-plain-generic_2017.20180305-
2_all.deb ...
Unpacking texlive-plain-generic (2017.20180305-2) ...
Selecting previously unselected package tipa.
Preparing to unpack .../45-tipa_2%3a1.3-20_all.deb ...
Unpacking tipa (2:1.3-20) ...
Selecting previously unselected package texlive-xetex.
Preparing to unpack .../46-texlive-xetex_2017.20180305-1_all.deb ...
Unpacking texlive-xetex (2017.20180305-1) ...
Setting up libgs9-common (9.26~dfsg+0-0ubuntu0.18.04.15) ...
Setting up libkpathsea6:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up libjs-jquery (3.2.1-1) ...
Setting up libtexlua52:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up fonts-droid-fallback (1:6.0.1r16-1.1) ...
Setting up libsynctex1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up libptexenc1:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up tex-common (6.09) ...
update-language: texlive-base not installed and configured, doing
nothing!
Setting up poppler-data (0.4.8-2) ...
Setting up tex-gyre (20160520-1) ...
Setting up preview-latex-style (11.91-1ubuntu1) ...
Setting up fonts-texgyre (20160520-1) ...
Setting up fonts-noto-mono (20171026-2) ...
Setting up fonts-lato (2.0-2) ...
Setting up libcupsfilters1:amd64 (1.20.2-0ubuntu3.1) ...
Setting up libcupsimage2:amd64 (2.2.7-1ubuntu2.8) ...
Setting up libjbig2dec0:amd64 (0.13-6) ...
Setting up ruby-did-you-mean (1.2.0-2) ...
Setting up t1utils (1.41-2) ...
Setting up ruby-net-telnet (0.1.1-2) ...
Setting up libijs-0.35:amd64 (0.35-13) ...
Setting up rubygems-integration (1.11) ...
Setting up libpotrace0 (1.14-2) ...
Setting up javascript-common (11) ...
Setting up ruby-minitest (5.10.3-1) ...
Setting up libzzip-0-13:amd64 (0.13.62-3.1ubuntu0.18.04.1) ...
Setting up libgs9:amd64 (9.26~dfsg+0-0ubuntu0.18.04.15) ...
Setting up libtexluajit2:amd64 (2017.20170613.44572-8ubuntu0.1) ...
Setting up fonts-lmodern (2.004.5-3) ...
Setting up ruby-power-assert (0.3.0-1) ...
Setting up texlive-binaries (2017.20170613.44572-8ubuntu0.1) ...
update-alternatives: using /usr/bin/xdvi-xaw to provide
/usr/bin/xdvi.bin (xdvi.bin) in auto mode
```

```
update-alternatives: using /usr/bin/bibtex.original to provide
/usr/bin/bibtex (bibtex) in auto mode
Setting up texlive-base (2017.20180305-1) ...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXLIVEDIST...
mktexlsr: Updating /var/lib/texmf/ls-R-TEXMFMAIN...
mktexlsr: Updating /var/lib/texmf/ls-R...
mktexlsr: Done.
tl-paper: setting paper size for dvips to a4:
/var/lib/texmf/dvips/config/config-paper.ps
tl-paper: setting paper size for dvipdfmx to a4:
/var/lib/texmf/dvipdfmx/dvipdfmx-paper.cfg
tl-paper: setting paper size for xdvi to a4: /var/lib/texmf/xdvi/XDvi-
paper
tl-paper: setting paper size for pdftex to a4:
/var/lib/texmf/tex/generic/config/pdftexconfig.tex
Setting up texlive-fonts-recommended (2017.20180305-1) ...
Setting up texlive-plain-generic (2017.20180305-2) ...
Setting up texlive-latex-base (2017.20180305-1) ...
Setting up lmodern (2.004.5-3) ...
Setting up texlive-latex-recommended (2017.20180305-1) ...
Setting up texlive-pictures (2017.20180305-1) ...
Setting up tipa (2:1.3-20) ...
Regenerating '/var/lib/texmf/fmtutil.cnf-DEBIAN'... done.
Regenerating '/var/lib/texmf/fmtutil.cnf-TEXLIVEDIST'... done.
update-fmtutil has updated the following file(s):
        /var/lib/texmf/fmtutil.cnf-DEBIAN
        /var/lib/texmf/fmtutil.cnf-TEXLIVEDIST
If you want to activate the changes in the above file(s),
you should run fmtutil-sys or fmtutil.
Setting up texlive (2017.20180305-1) ...
Setting up texlive-latex-extra (2017.20180305-2) ...
Setting up texlive-xetex (2017.20180305-1) ...
Setting up ruby2.5 (2.5.1-1ubuntu1.11) ...
Setting up ruby (1:2.5.1) ...
Setting up ruby-test-unit (3.2.5-1) ...
Setting up rake (12.3.1-1ubuntu0.1) ...
Setting up libruby2.5:amd64 (2.5.1-1ubuntu1.11) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.3) ...
/sbin/ldconfig.real:
/usr/local/lib/python3.7/dist-packages/ideep4py/lib/libmkldnn.so.0 is
not a symbolic link

Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for fontconfig (2.12.6-0ubuntu2) ...
Processing triggers for tex-common (6.09) ...
Running updmap-sys. This may take some time... done.
Running mktexlsr /var/lib/texmf ... done.
Building format(s) --all.
        This may take some time... done.
```

```
Get:1 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/
InRelease [3,626 B]
Ign:2
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/
x86_64  InRelease
Ign:3
https://developer.download.nvidia.com/compute/machine-learning/repos/
ubuntu1804/x86_64  InRelease
Get:4
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/
x86_64  Release [696 B]
Hit:5
https://developer.download.nvidia.com/compute/machine-learning/repos/
ubuntu1804/x86_64  Release
Get:6
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/
x86_64  Release.gpg [836 B]
Get:7 http://security.ubuntu.com/ubuntu bionic-security InRelease
[88.7 kB]
Get:8 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/
Packages [76.8 kB]
Hit:9 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:10 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic
InRelease [15.9 kB]
Get:12 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7
kB]
Get:13
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/
x86_64  Packages [931 kB]
Hit:14 http://ppa.launchpad.net/cran/libgit2/ubuntu bionic InRelease
Get:15 http://security.ubuntu.com/ubuntu bionic-security/universe
amd64 Packages [1,474 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-backports InRelease
[74.6 kB]
Hit:17 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu bionic InRelease
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64
Packages [2,252 kB]
Get:19 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic
InRelease [21.3 kB]
Get:20 http://security.ubuntu.com/ubuntu bionic-security/main amd64
Packages [2,596 kB]
Get:21 http://security.ubuntu.com/ubuntu bionic-security/restricted
amd64 Packages [806 kB]
Get:22 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu
bionic/main Sources [1,827 kB]
Get:23 http://archive.ubuntu.com/ubuntu bionic-updates/restricted
amd64 Packages [840 kB]
Get:24 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64
Packages [3,035 kB]
Get:25 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu
```

```
bionic/main amd64 Packages [936 kB]
Get:26 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu
bionic/main amd64 Packages [42.8 kB]
Fetched 15.1 MB in 4s (3,571 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree
Reading state information... Done
texlive-fonts-recommended is already the newest version
(2017.20180305-1).
texlive-fonts-recommended set to manually installed.
texlive-plain-generic is already the newest version (2017.20180305-2).
texlive-plain-generic set to manually installed.
texlive-xetex is already the newest version (2017.20180305-1).
The following package was automatically installed and is no longer
required:
  libnvidia-common-470
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 75 not upgraded.
Collecting pypandoc
  Downloading pypandoc-1.7.2-py2.py3-none-any.whl (29 kB)
Installing collected packages: pypandoc
Successfully installed pypandoc-1.7.2
Mounted at /content/drive
[NbConvertApp] Converting notebook Copy of HW1_SP22.ipynb to PDF
[NbConvertApp] Support files will be in Copy of HW1_SP22_files/
[NbConvertApp] Making directory ./Copy of HW1_SP22_files
[NbConvertApp] Making directory ./Copy of HW1_SP22_files
[NbConvertApp] Making directory ./Copy of HW1_SP22_files
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[NbConvertApp] Making directory ./Copy of HW1_SP22_files
[NbConvertApp] Making directory ./Copy of HW1_SP22_files
[NbConvertApp] Writing 73257 bytes to ./notebook.tex
[NbConvertApp] Building PDF
[NbConvertApp] Running xelatex 3 times: [u'xelatex',
u'./notebook.tex', '-quiet']
[NbConvertApp] CRITICAL | xelatex failed: [u'xelatex',
u'./notebook.tex', '-quiet']
This is XeTeX, Version 3.14159265-2.6-0.99998 (TeX Live 2017/Debian)
(preloaded format=xelatex)
 restricted \write18 enabled.
entering extended mode
(./notebook.tex
LaTeX2e <2017-04-15>
Babel <3.18> and hyphenation patterns for 3 language(s) loaded.
(/usr/share/texlive/texmf-dist/tex/latex/base/article.cls
Document Class: article 2014/09/29 v1.4h Standard LaTeX document class
(/usr/share/texlive/texmf-dist/tex/latex/base/size11.clo))
```

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(/usr/share/texlive/texmf-dist/tex/latex/tcolorbox/tcolorbox.sty
(/usr/share/texlive/texmf-dist/tex/latex/pgf/basiclayer/pgf.sty
(/usr/share/texlive/texmf-dist/tex/latex/pgf/utilities/pgfrcs.sty
(/usr/share/texlive/texmf-dist/tex/generic/pgf/utilities/pgfutil-
common.tex
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ex)) (/usr/share/texlive/texmf-dist/tex/generic/pgf/utilities/pgfutil-
latex.def
(/usr/share/texlive/texmf-dist/tex/latex/ms/everyshi.sty))
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ex))
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(/usr/share/texlive/texmf-dist/tex/latex/graphics/graphicx.sty
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(/usr/share/texlive/texmf-dist/tex/latex/graphics/trig.sty)
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dvipdfmx.def
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common-pdf.de
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(/usr/share/texlive/texmf-dist/tex/latex/graphics-cfg/color.cfg))
(/usr/share/texlive/texmf-dist/tex/generic/pgf/basiclayer/pgfcore.code
.tex
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.tex)
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.code.tex
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(/usr/share/texlive/texmf-dist/tex/generic/pgf/modules/pgfmoduleplot.c
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)
(/usr/share/texlive/texmf-dist/tex/latex/pgf/compatibility/pgfcomp-
version-0-65
.sty)
(/usr/share/texlive/texmf-dist/tex/latex/pgf/compatibility/pgfcomp-
version-1-18
.sty)) (/usr/share/texlive/texmf-dist/tex/latex/tools/verbatim.sty)
(/usr/share/texlive/texmf-dist/tex/latex/environ/environ.sty
(/usr/share/texlive/texmf-dist/tex/latex/trimspaces/trimspaces.sty))
(/usr/share/texlive/texmf-dist/tex/latex/etoolbox/etoolbox.sty)
(/usr/share/texlive/texmf-dist/tex/latex/tcolorbox/tcbbreakable.code.t
ex
Library (tcolorbox): 'tcbbreakable.code.tex' version '4.12'
)) (/usr/share/texlive/texmf-dist/tex/latex/float/float.sty)
(/usr/share/texlive/texmf-dist/tex/latex/base/fontenc.sty
(/usr/share/texlive/texmf-dist/tex/latex/base/t1enc.def)
(/usr/share/texmf/tex/latex/lm/t1lmr.fd))
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/mathpazo.sty)
```

```
(/usr/share/texlive/texmf-dist/tex/latex/caption/caption.sty
(/usr/share/texlive/texmf-dist/tex/latex/caption/caption3.sty))
(/usr/share/texlive/texmf-dist/tex/latex/adjustbox/adjustbox.sty
(/usr/share/texlive/texmf-dist/tex/latex/xkeyval/xkeyval.sty
(/usr/share/texlive/texmf-dist/tex/generic/xkeyval/xkeyval.tex
(/usr/share/texlive/texmf-dist/tex/generic/xkeyval/xkvutils.tex)))
(/usr/share/texlive/texmf-dist/tex/latex/adjustbox/adjcalc.sty)
(/usr/share/texlive/texmf-dist/tex/latex/adjustbox/trimclip.sty
(/usr/share/texlive/texmf-dist/tex/latex/collectbox/collectbox.sty)
(/usr/share/texlive/texmf-dist/tex/latex/adjustbox/tc-xetex.def))
(/usr/share/texlive/texmf-dist/tex/latex/ifoddpage/ifoddpage.sty)
(/usr/share/texlive/texmf-dist/tex/latex/varwidth/varwidth.sty))
(/usr/share/texlive/texmf-dist/tex/latex/tools/enumerate.sty)
(/usr/share/texlive/texmf-dist/tex/latex/geometry/geometry.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/ifpdf.sty)
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/ifvtex.sty)
(/usr/share/texlive/texmf-dist/tex/generic/ifxetex/ifxetex.sty))
(/usr/share/texlive/texmf-dist/tex/latex/amsmath/amsmath.sty
For additional information on amsmath, use the `?' option.
(/usr/share/texlive/texmf-dist/tex/latex/amsmath/amstext.sty
(/usr/share/texlive/texmf-dist/tex/latex/amsmath/amsgen.sty))
(/usr/share/texlive/texmf-dist/tex/latex/amsmath/amsbsy.sty)
(/usr/share/texlive/texmf-dist/tex/latex/amsmath/amsopn.sty))
(/usr/share/texlive/texmf-dist/tex/latex/amsfonts/amssymb.sty
(/usr/share/texlive/texmf-dist/tex/latex/amsfonts/amsfonts.sty))
(/usr/share/texlive/texmf-dist/tex/latex/base/textcomp.sty
(/usr/share/texlive/texmf-dist/tex/latex/base/ts1enc.def))
(/usr/share/texlive/texmf-dist/tex/latex/upquote/upquote.sty)
(/usr/share/texlive/texmf-dist/tex/latex/eurosym/eurosym.sty)
(/usr/share/texlive/texmf-dist/tex/latex/ucs/ucs.sty
(/usr/share/texlive/texmf-dist/tex/latex/ucs/data/uni-global.def))
(/usr/share/texlive/texmf-dist/tex/latex/base/inputenc.sty

Package inputenc Warning: inputenc package ignored with utf8 based
engines.

) (/usr/share/texlive/texmf-dist/tex/latex/fancyvrb/fancyvrb.sty
Style option: `fancyvrb' v2.7a, with DG/SPQR fixes, and
firstline=lastline fix
<2008/02/07> (tvz))
(/usr/share/texlive/texmf-dist/tex/latex/oberdiek/grffile.sty
(/usr/share/texlive/texmf-dist/tex/latex/oberdiek/kvoptions.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/ltxcmds.sty)
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/kvsetkeys.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/infwarerr.sty)
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/etexcmds.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/ifluatex.sty))))
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/pdftexcmds.sty))
(/usr/share/texlive/texmf-dist/tex/latex/hyperref/hyperref.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/hobsub-
```

hyperref.sty
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/hobsub-
generic.sty))
(/usr/share/texlive/texmf-dist/tex/latex/oberdiek/auxhook.sty)
(/usr/share/texlive/texmf-dist/tex/latex/hyperref/pd1enc.def)
(/usr/share/texlive/texmf-dist/tex/latex/latexconfig/hyperref.cfg)
(/usr/share/texlive/texmf-dist/tex/latex/url/url.sty))
(/usr/share/texlive/texmf-dist/tex/latex/hyperref/hxetex.def
(/usr/share/texlive/texmf-dist/tex/latex/hyperref/puenc.def)
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/stringenc.sty)
(/usr/share/texlive/texmf-dist/tex/latex/oberdiek/rerunfilecheck.sty))
(/usr/share/texlive/texmf-dist/tex/latex/tools/longtable.sty)
(/usr/share/texlive/texmf-dist/tex/latex/booktabs/booktabs.sty)
(/usr/share/texlive/texmf-dist/tex/latex/enumitem/enumitem.sty)
(/usr/share/texlive/texmf-dist/tex/generic/ulem/ulem.sty)
(/usr/share/texlive/texmf-dist/tex/latex/jknapltx/mathrsfs.sty)
No file notebook.aux.
(/usr/share/texlive/texmf-dist/tex/latex/base/ts1cmr.fd)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/t1ppl.fd)
ABD: EveryShipout initializing macros
(/usr/share/texlive/texmf-dist/tex/latex/caption/ltcaption.sty)
geometry driver: auto-detecting
geometry detected driver: xetex
geometry verbose mode - [preamble] result:
* driver: xetex
* paper: <default>
* layout: <same size as paper>
* layoutoffset:(h,v)=(0.0pt,0.0pt)
* modes:
* h-part:(L,W,R)=(72.26999pt, 469.75502pt, 72.26999pt)
* v-part:(T,H,B)=(72.26999pt, 650.43001pt, 72.26999pt)
* \paperwidth=614.295pt
* \paperheight=794.96999pt
* \textwidth=469.75502pt
* \textheight=650.43001pt
* \oddsidemargin=0.0pt
* \evensidemargin=0.0pt
* \topmargin=-37.0pt
* \headheight=12.0pt
* \headsep=25.0pt
* \topskip=11.0pt
* \footskip=30.0pt
* \marginparwidth=59.0pt
* \marginparsep=10.0pt
* \columnsep=10.0pt
* \skip\footins=10.0pt plus 4.0pt minus 2.0pt
* \hoffset=0.0pt
* \voffset=0.0pt
* \mag=1000
* \@twocolumnfalse

```
* \@twosidefalse
* \@mparswitchfalse
* \@reversemarginfalse
* (1in=72.27pt=25.4mm, 1cm=28.453pt)

(/usr/share/texlive/texmf-dist/tex/latex/ucs/ucsencs.def)
(/usr/share/texlive/texmf-dist/tex/latex/hyperref/nameref.sty)
(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/gettitlestring.sty
))

Package hyperref Warning: Rerun to get /PageLabels entry.

(/usr/share/texlive/texmf-dist/tex/latex/psnfss/ot1ppl.fd)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/omlzplm.fd)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/omszplm.fd)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/omxzplm.fd)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/ot1zplm.fd)
(/usr/share/texlive/texmf-dist/tex/latex/jknapltx/ursfs.fd)

LaTeX Warning: No \author given.

(/usr/share/texlive/texmf-dist/tex/generic/oberdiek/se-ascii-
print.def)
(/usr/share/texlive/texmf-dist/tex/latex/psnfss/ts1ppl.fd)

Package hyperref Warning: Difference (2) between bookmark levels is
greater
(hyperref)                than one, level fixed on input line 397.

[1]

! LaTeX Error: Too deeply nested.

See the LaTeX manual or LaTeX Companion for explanation.
Type  H <return>  for immediate help.
 ...

l.460        \def
                \labelenumv{\alph{enumv})}
?
! Emergency stop.
 ...

l.460        \def
                \labelenumv{\alph{enumv})}
Output written on notebook.pdf (1 page).
Transcript written on notebook.log.
```

```
[NbConvertApp] PDF successfully created
[NbConvertApp] Writing 14689 bytes to Copy of HW1_SP22.pdf
```