imu_noise.R

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```
if (!require("data.table")){
    install.packages("data.table", repos="https://cran.rstudio.com/")
    library("data.table")
}
```

```
## Loading required package: data.table
```

```
if (!require("fitdistrplus")){
    install.packages("fitdistrplus", repos="https://cran.rstudio.com/")
    library("fitdistrplus")
}
```

```
## Loading required package: fitdistrplus
```

```
## Loading required package: MASS
```

```
## Loading required package: survival
```

```
file_name <- "/home/matt/thesis/experiment_data/one_mobile_noisy_true/turtlebot1_raw_imu_data.csv"
imu <- fread(file_name, header=T, sep=",")

summary(imu$yaw)
```

```
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## -3.139000 -1.555000 -0.006608  0.003200  1.579000  3.139000
```

```
summary(imu$x_vel)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.1036  0.1117  0.1149  0.1154  0.1194  0.1260
```

```
summary(imu$z_vel)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   10.04   10.06   10.07   10.08   10.09   10.13
```

```
summary(imu$x_acc)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   4.745   6.171   6.334   6.375   6.530   9.234
```

```r
shapiro.test(imu$yaw)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  imu$yaw
## W = 0.95528, p-value = 2.822e-12
```

```r
shapiro.test(imu$x_vel)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  imu$x_vel
## W = 0.97896, p-value = 2.053e-07
```

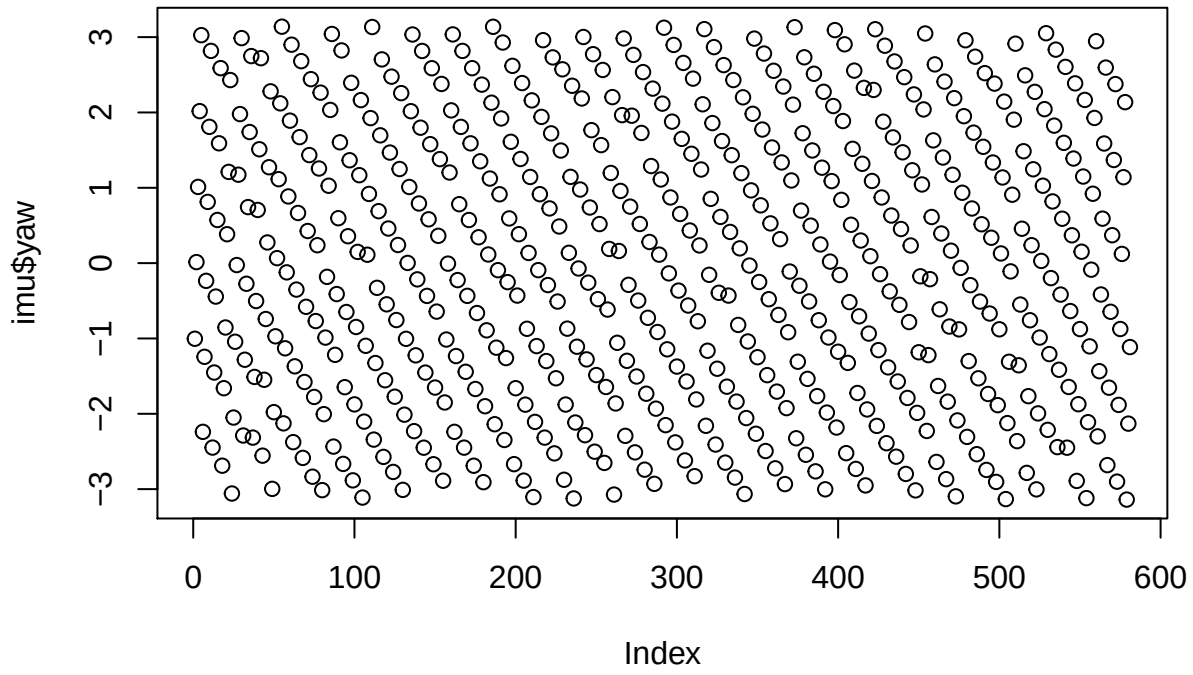
```r
shapiro.test(imu$z_vel)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  imu$z_vel
## W = 0.94714, p-value = 1.518e-13
```

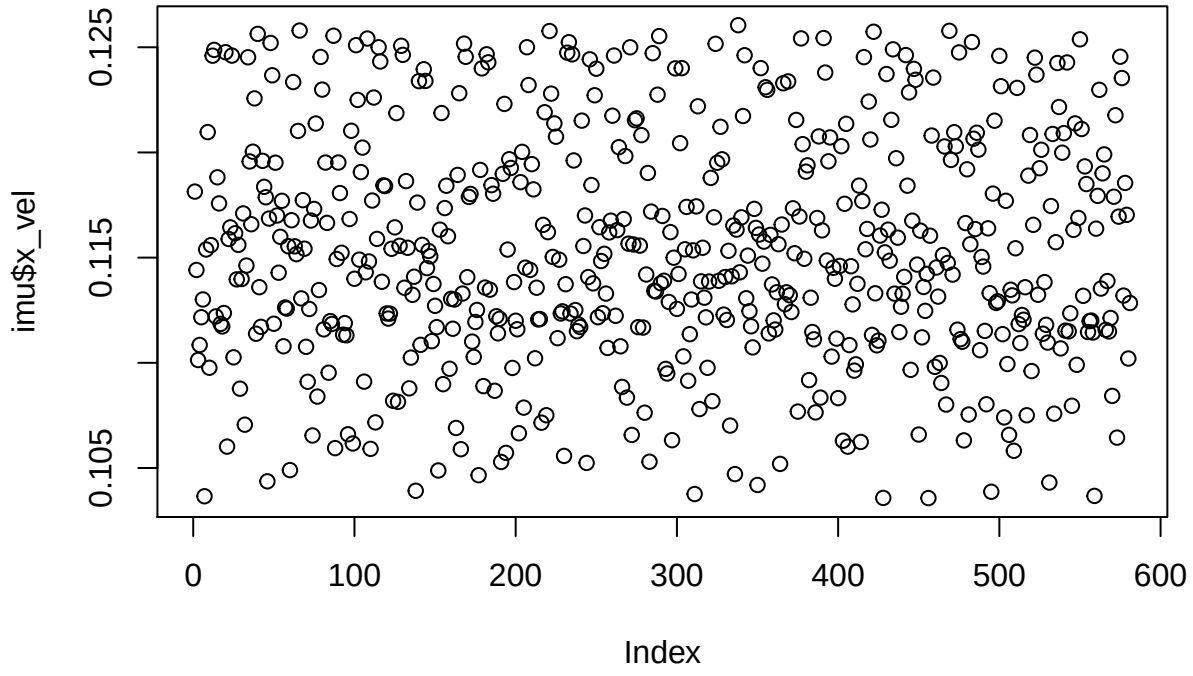
```r
shapiro.test(imu$x_acc)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  imu$x_acc
## W = 0.88267, p-value < 2.2e-16
```

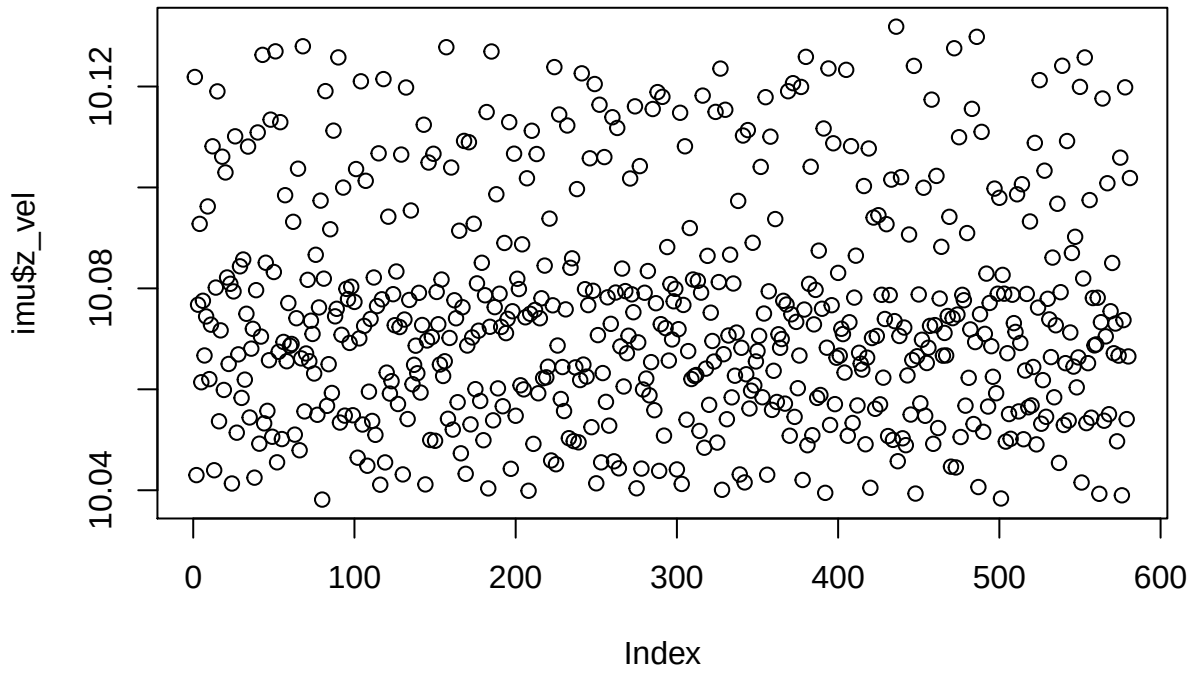
```r
plot(imu$yaw)
```



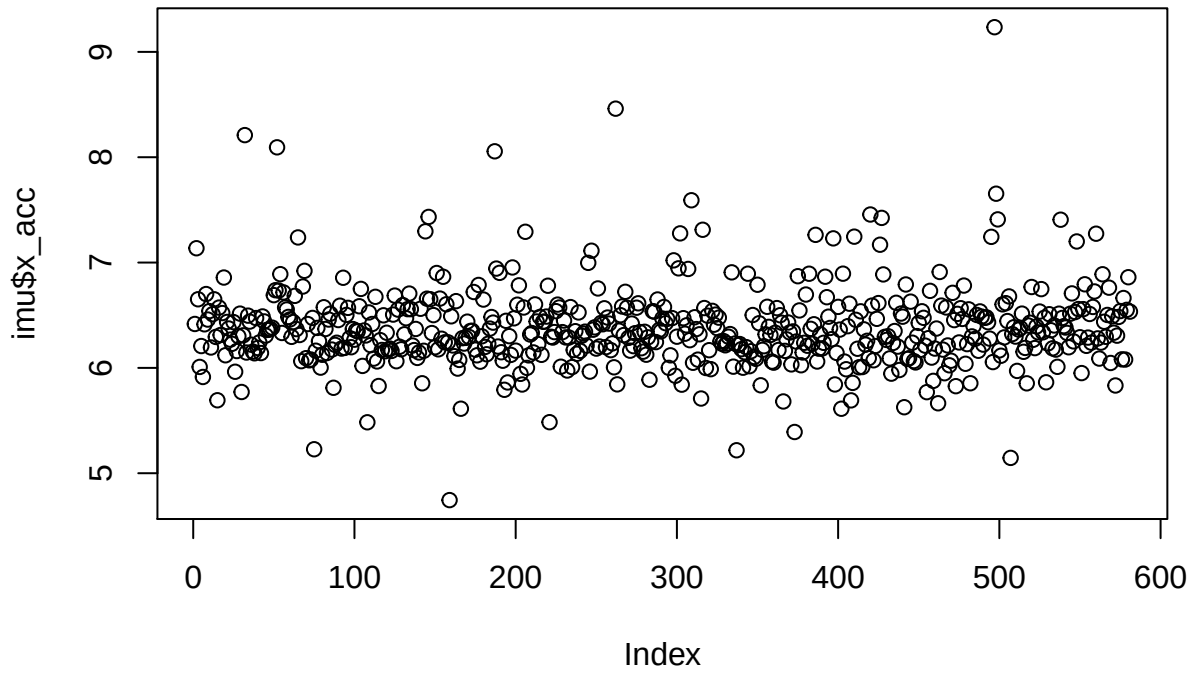

```
plot(imu$x_vel)
```



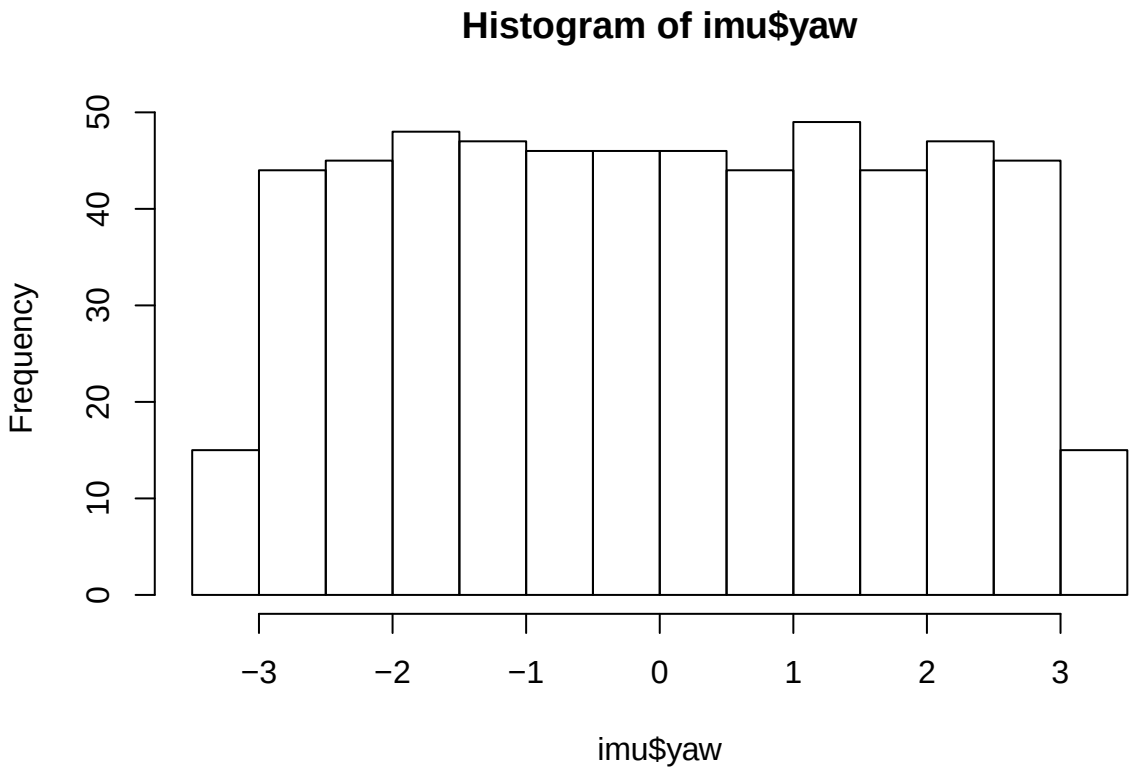

```
plot(imu$z_vel)
```



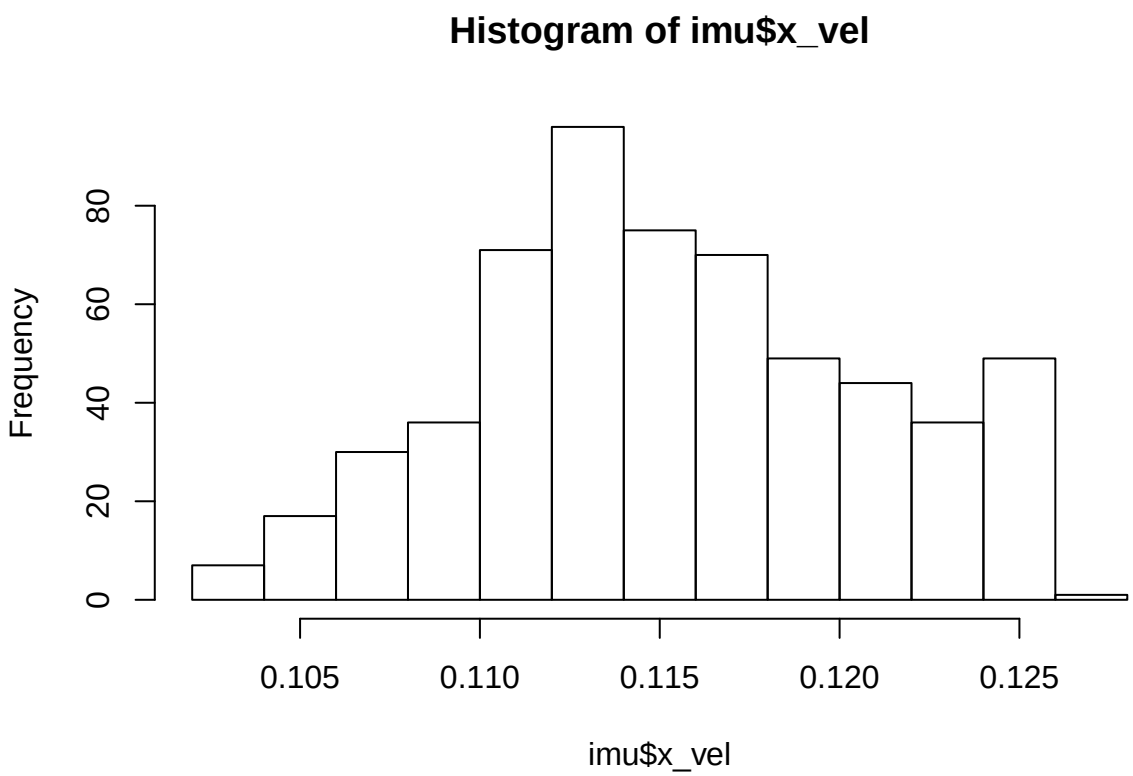

```
plot(imu$x_acc)
```



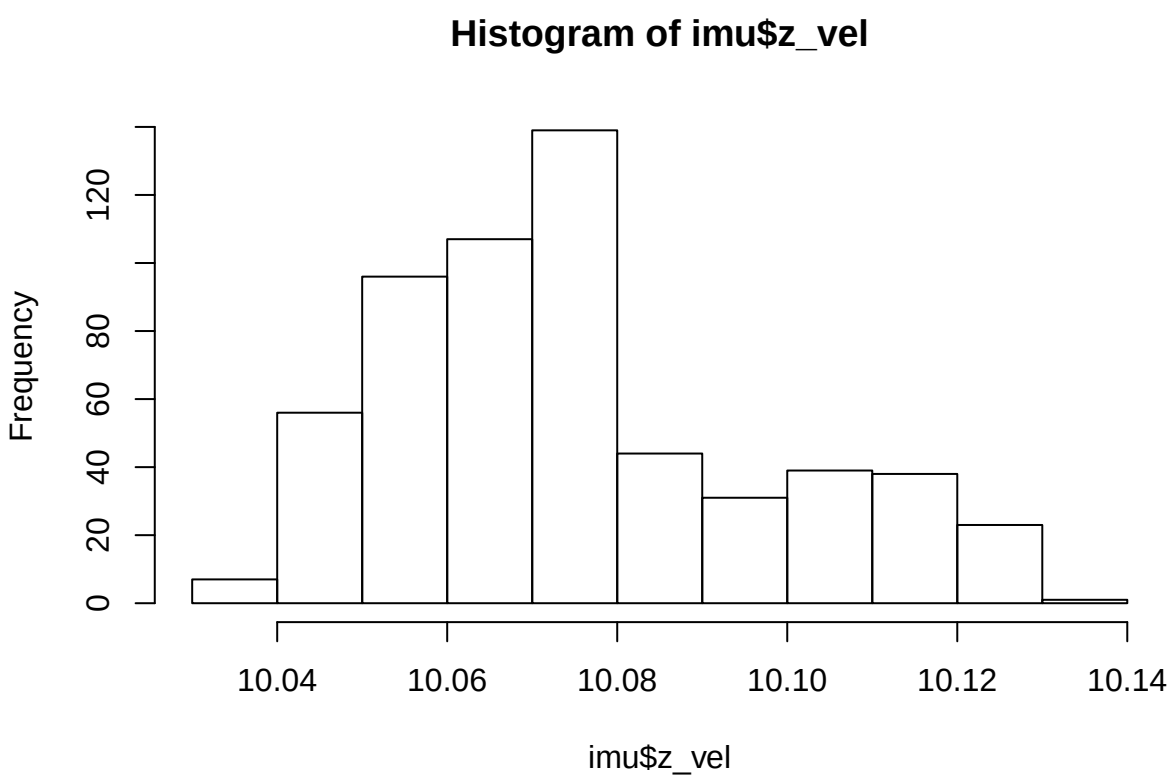

```
hist(imu$yaw)
```



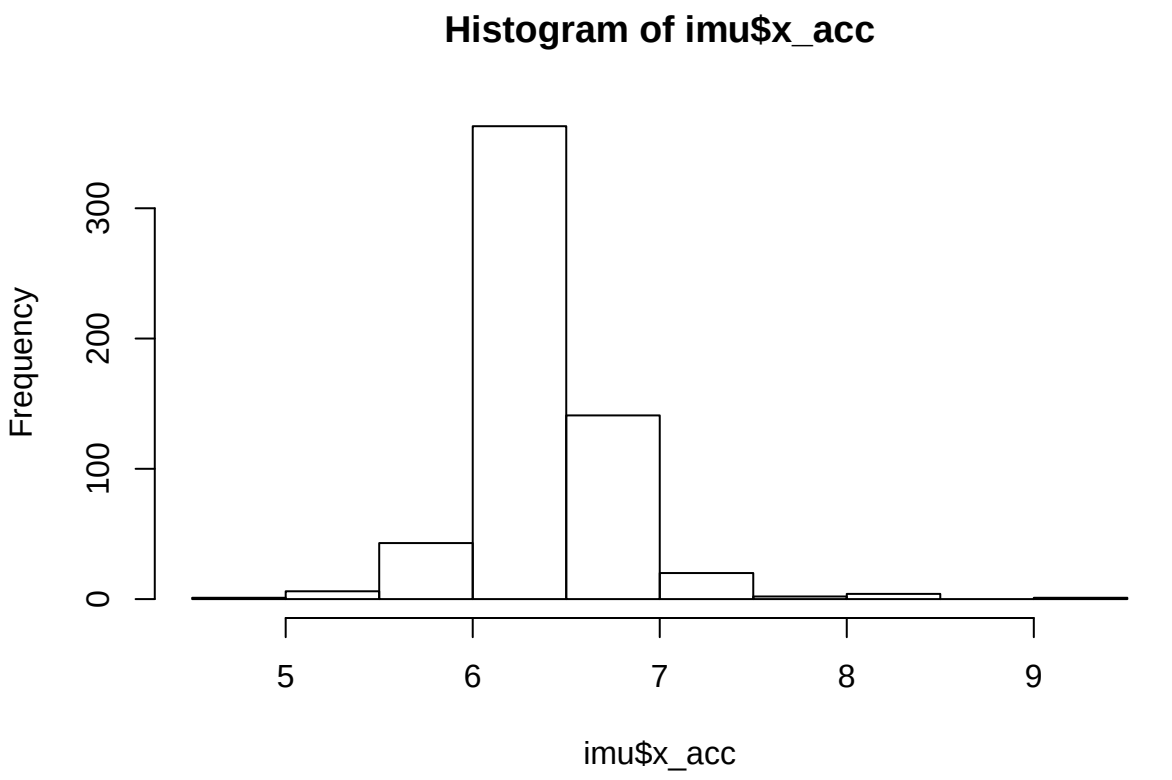

```
hist(imu$x_vel)
```



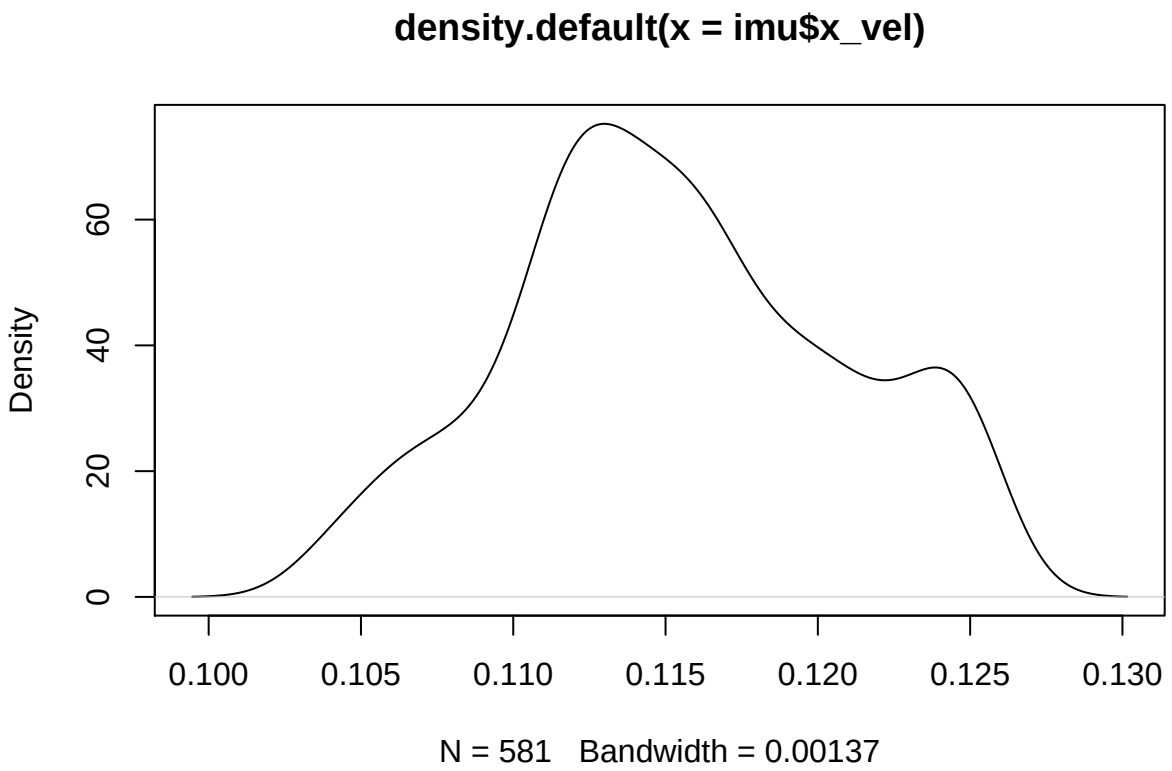
```
hist(imu$z_vel)
```



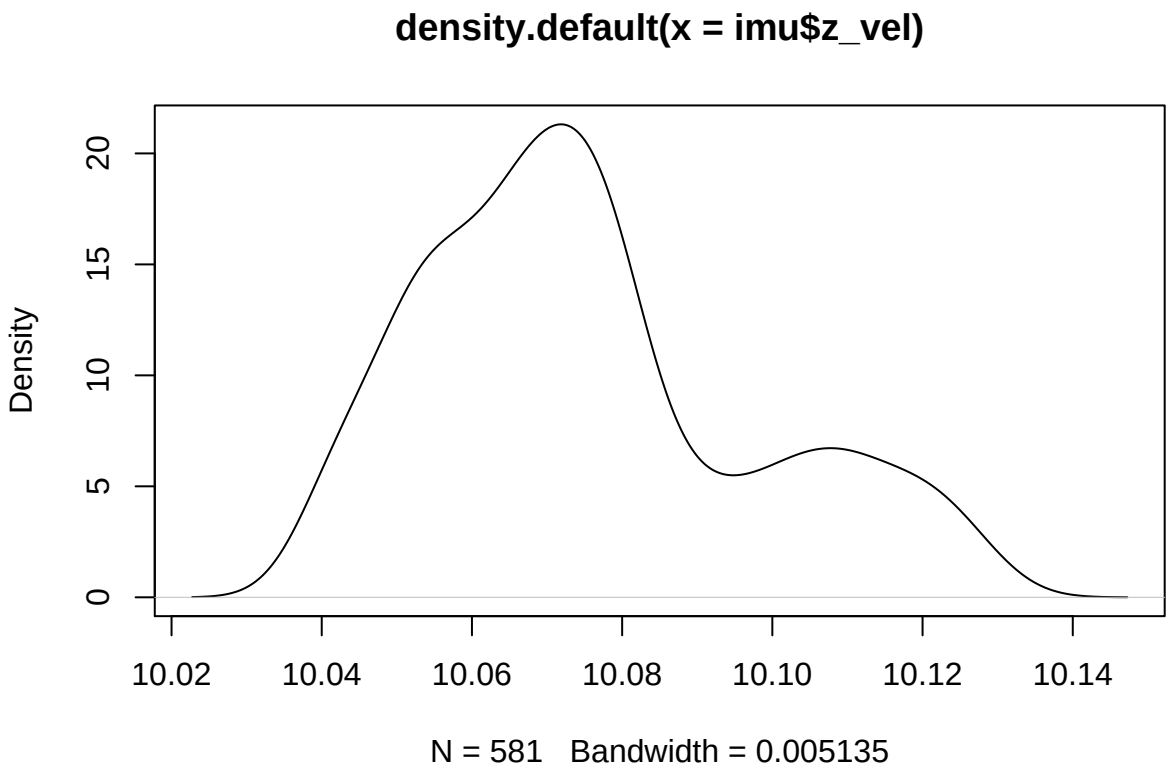

```
hist(imu$x_acc)
```



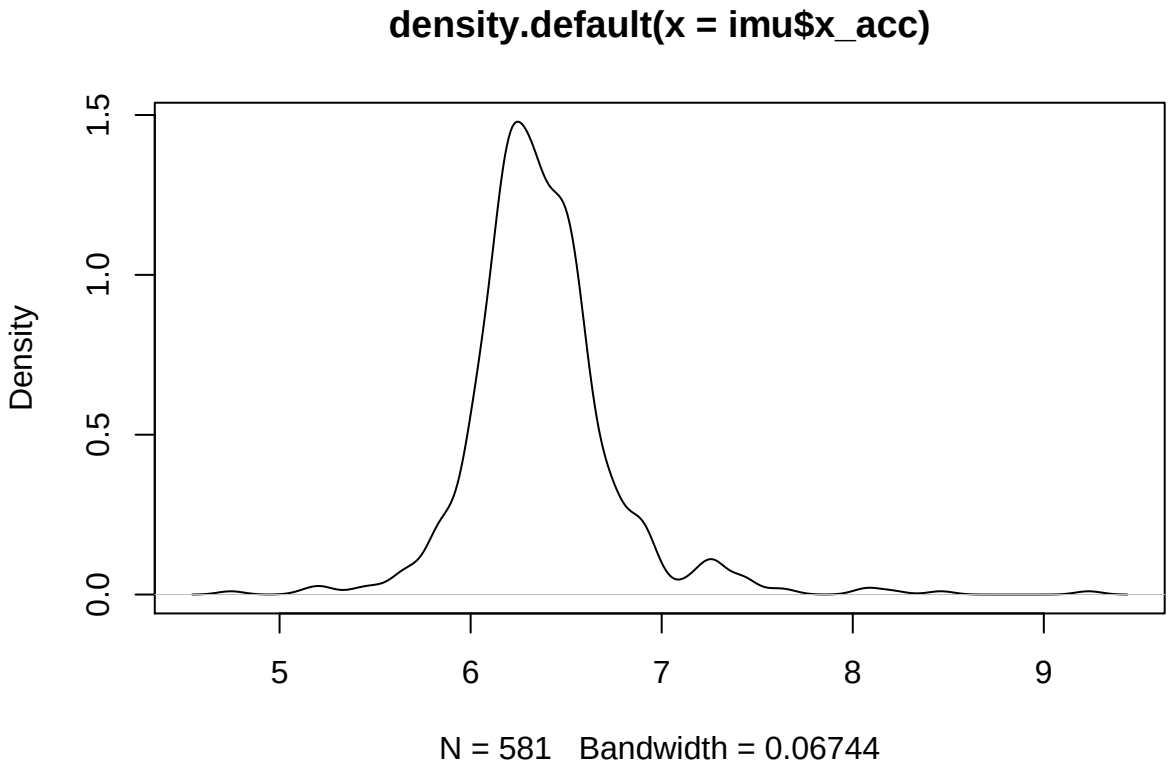
```
plot(density(imu$x_vel))
```



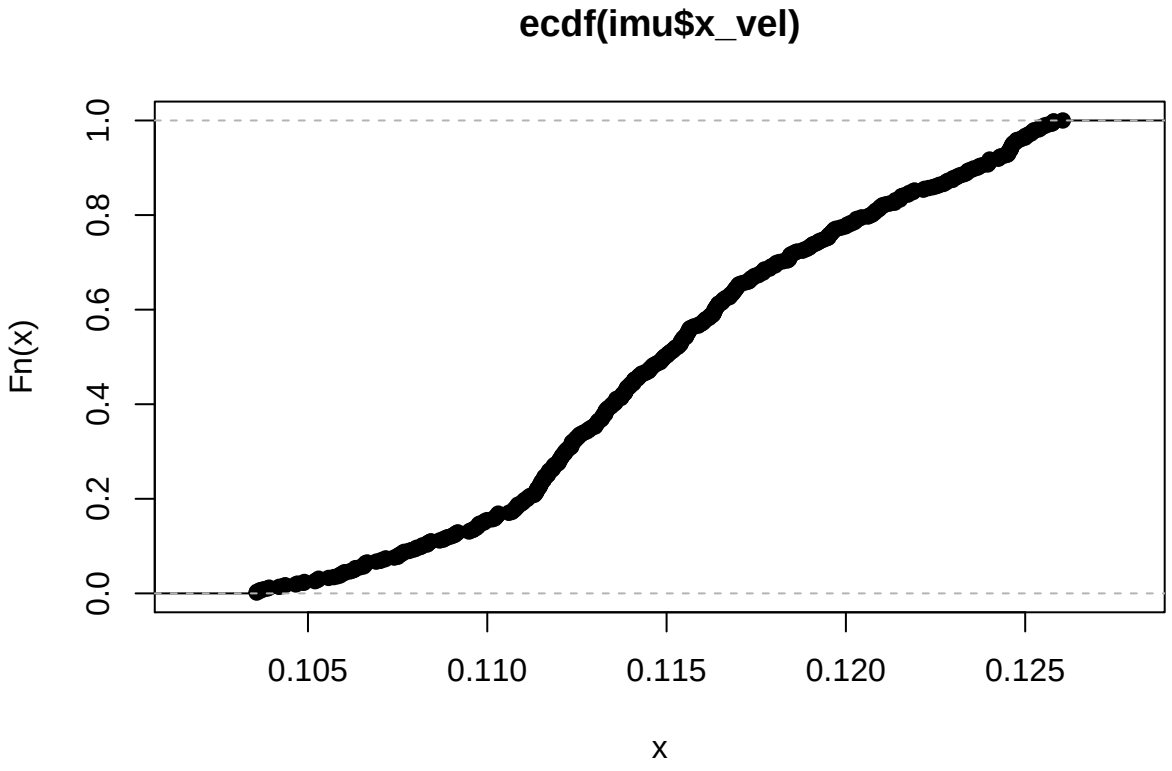

```
plot(density(imu$z_vel))
```



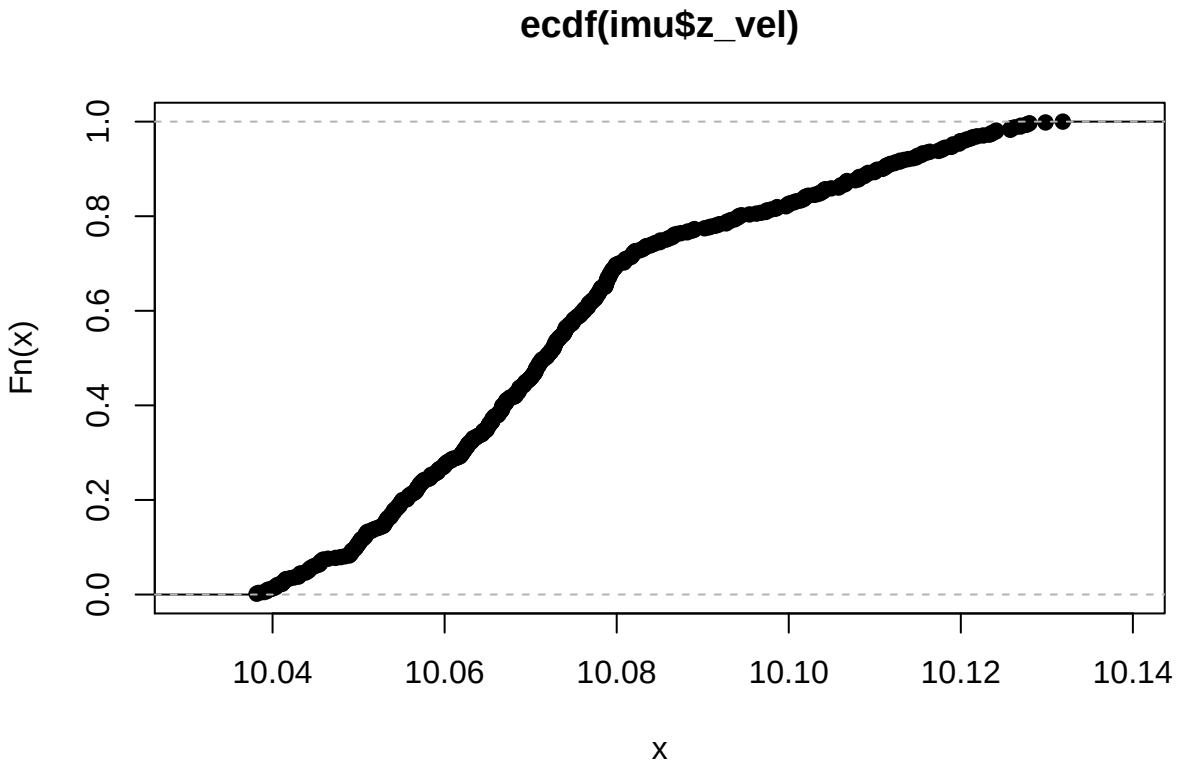
```
plot(density(imu$x_acc))
```



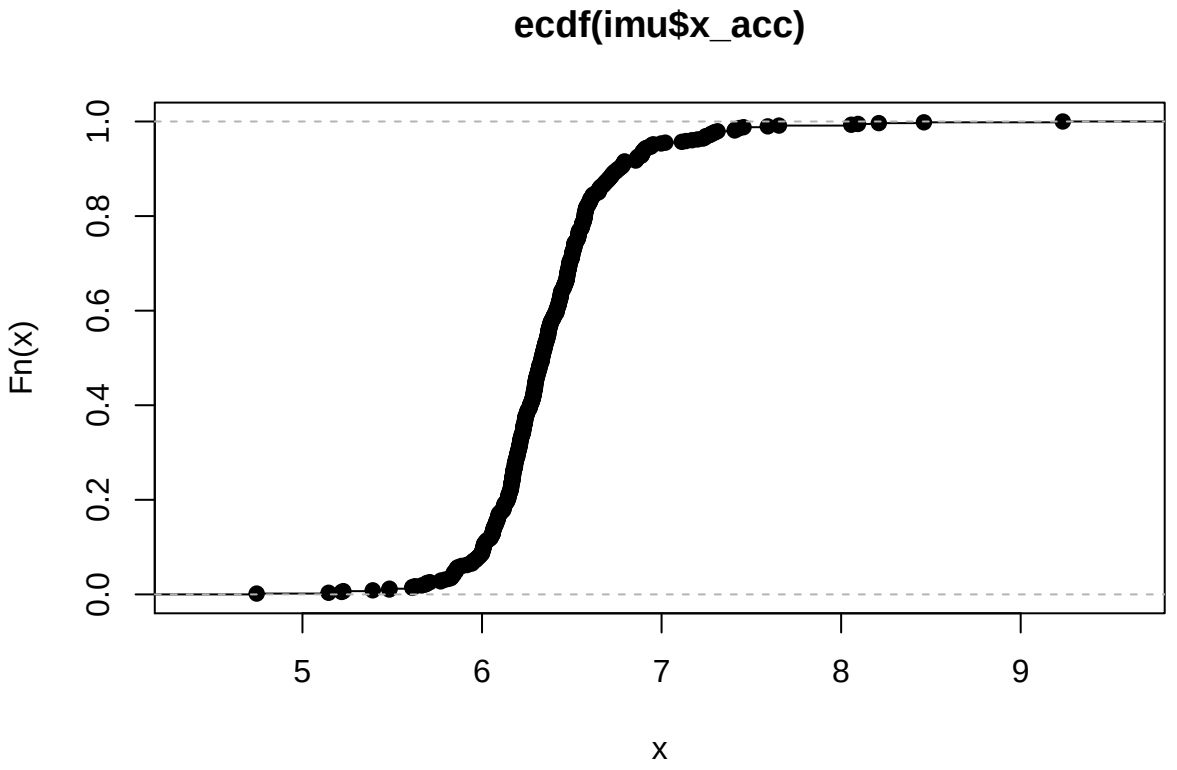

```
plot(ecdf(imu$x_vel))
```



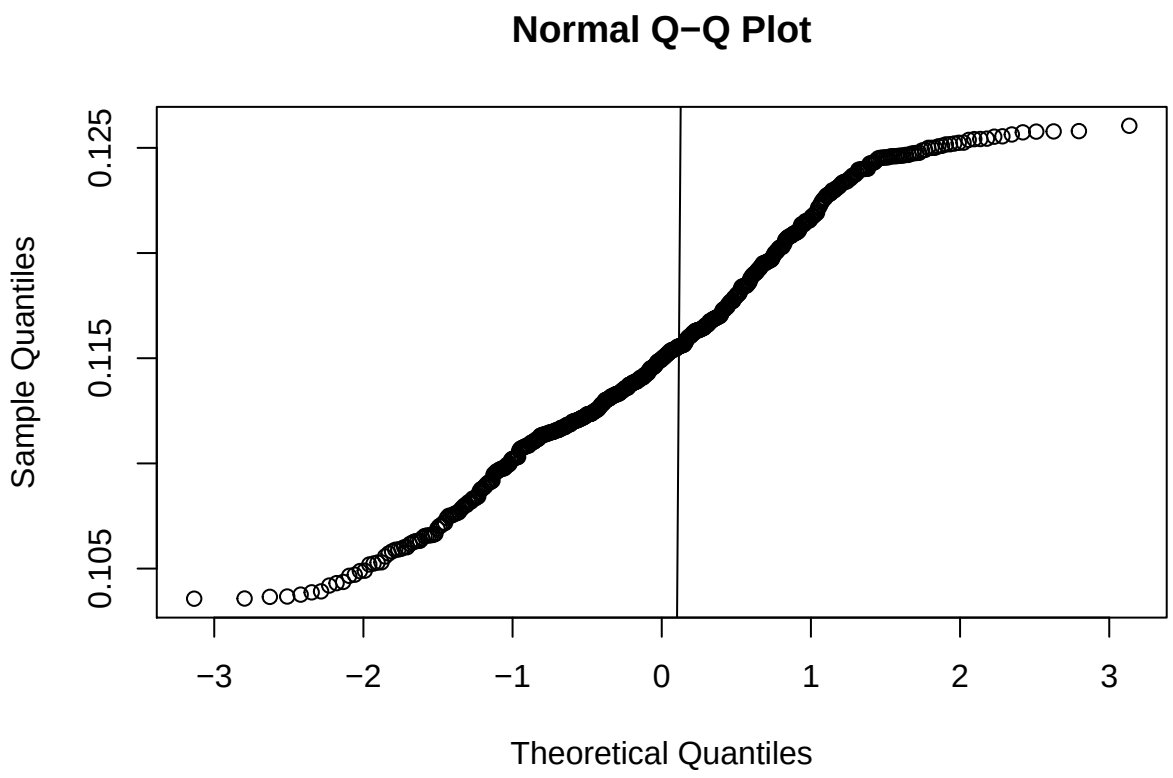
```
plot(ecdf(imu$z_vel))
```



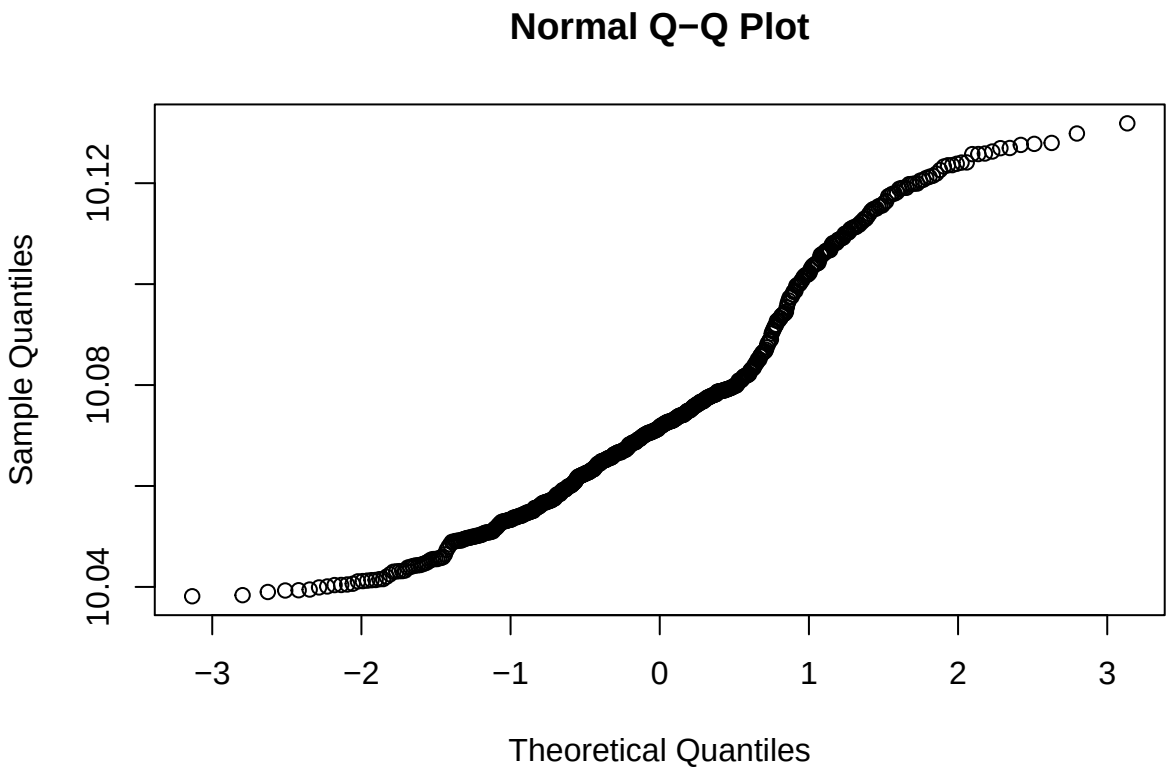

```
plot(ecdf(imu$x_acc))
```



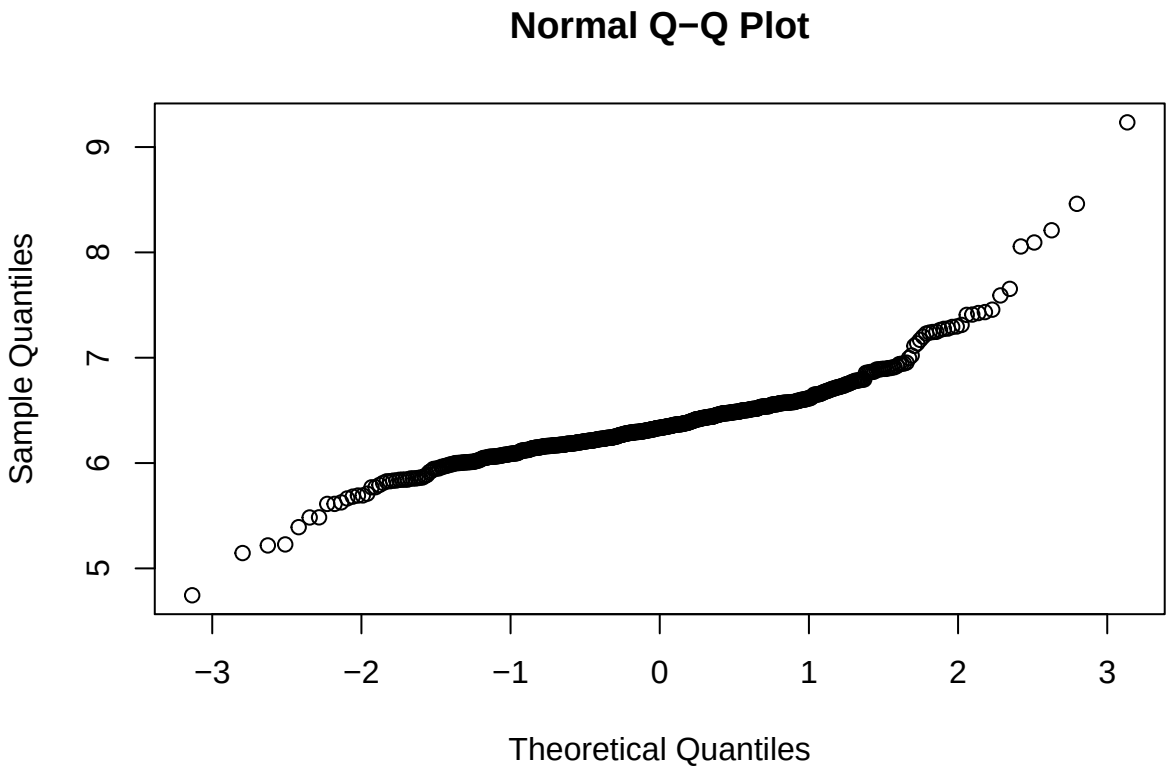
```
qqnorm(imu$x_vel)
abline(0,1)
```



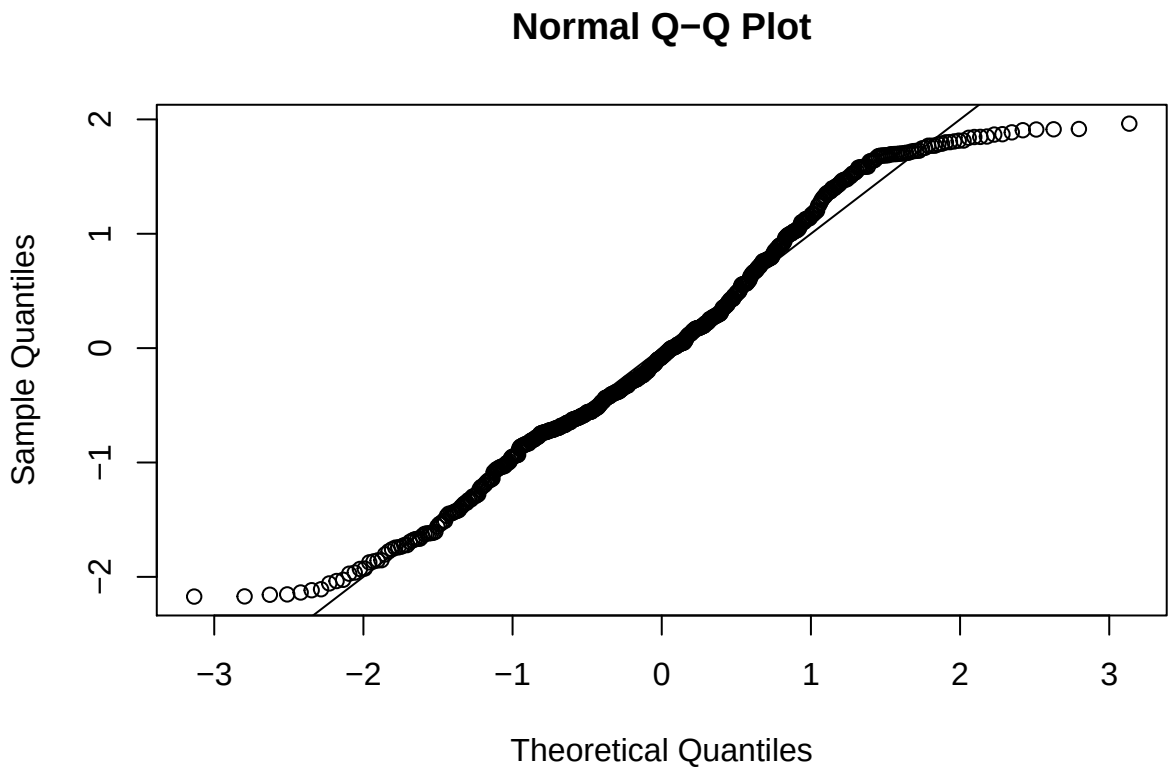

```
qqnorm(imu$z_vel)
abline(0,1)
```



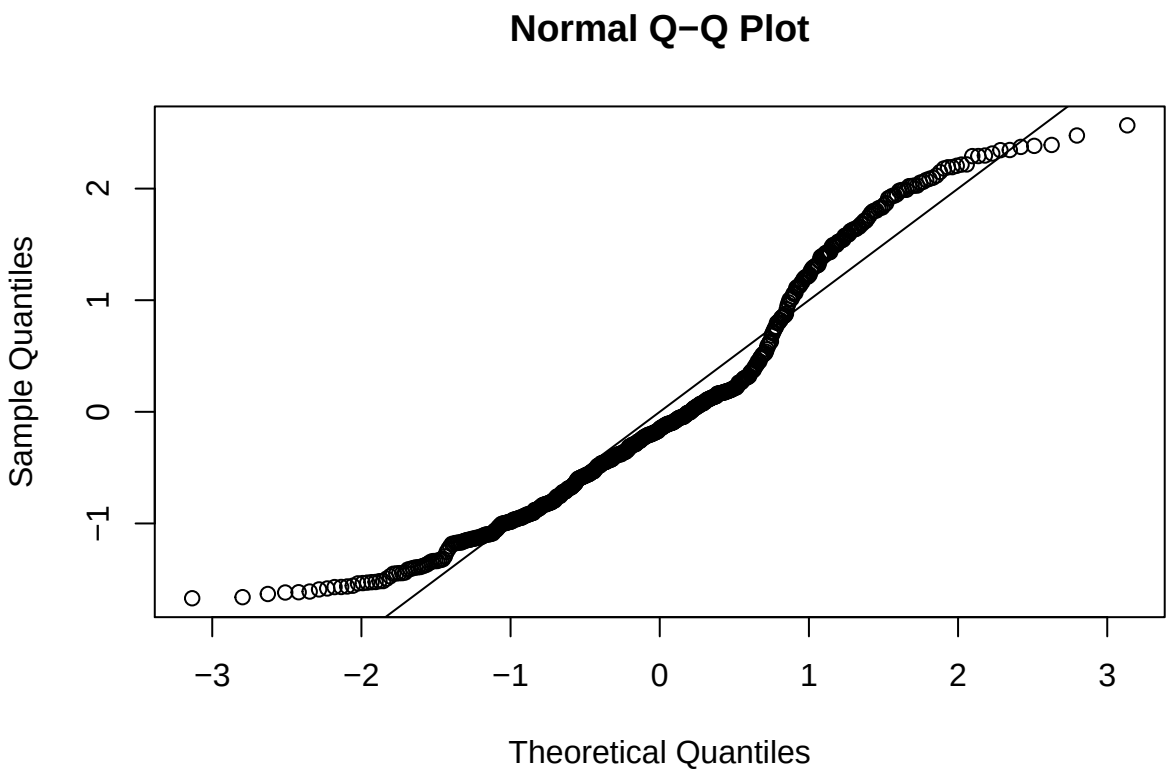

```r
qqnorm(imu$x_acc)
abline(0,1)
```



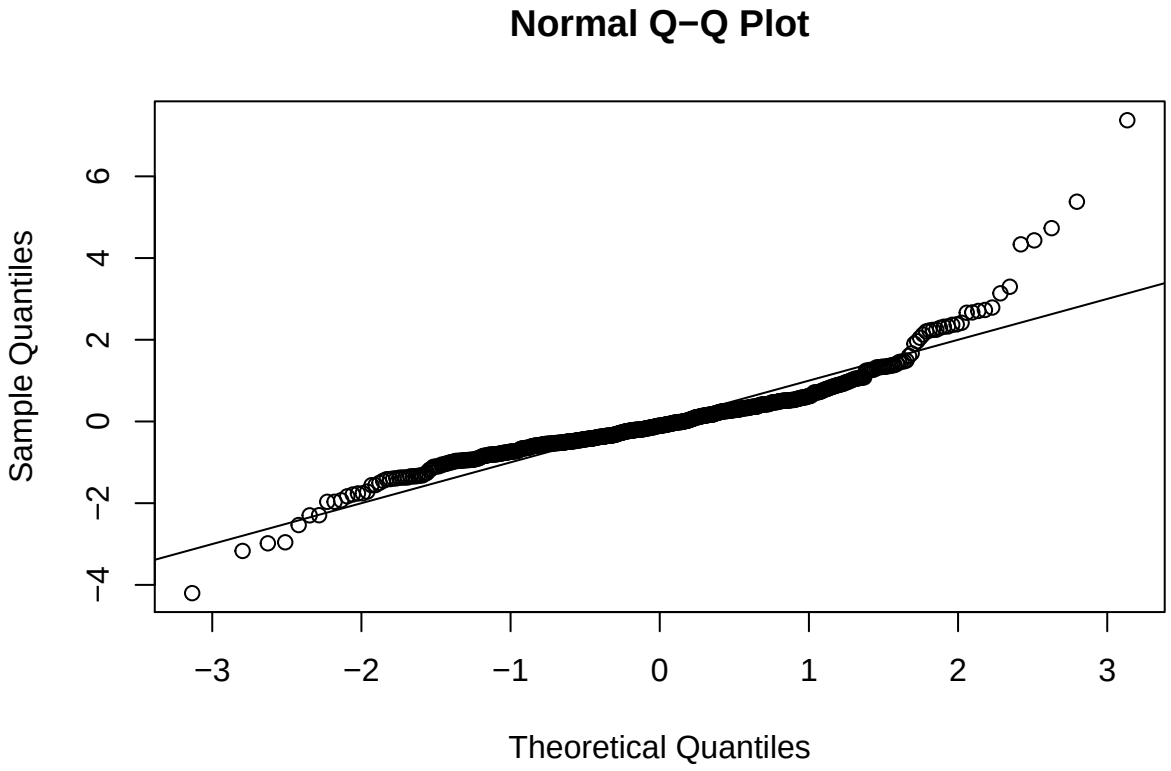
```
x_vel_std <- (imu$x_vel - mean(imu$x_vel)) / sd(imu$x_vel)
qqnorm(x_vel_std)
abline(0,1)
```




```
z_vel_std <- (imu$z_vel - mean(imu$z_vel)) / sd(imu$z_vel)
qqnorm(z_vel_std)
abline(0,1)
```




```
x_acc_std <- (imu$x_acc - mean(imu$x_acc)) / sd(imu$x_acc)
qqnorm(x_acc_std)
abline(0,1)
```



```r
#shapiro.test(imu$yaw)
shapiro.test(x_vel_std)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  x_vel_std
## W = 0.97896, p-value = 2.053e-07
```

```r
shapiro.test(z_vel_std)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  z_vel_std
## W = 0.94714, p-value = 1.518e-13
```

```r
shapiro.test(x_acc_std)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  x_acc_std
## W = 0.88267, p-value < 2.2e-16
```

```r
# plot(imu$yaw, main="IMU Yaw Readings", sub="Stationary")
# plot(imu$x_vel, main="IMU X Velocity Readings", sub="Stationary")
# plot(imu$y_vel, main="IMU Y Velocity Readings", sub="Stationary")
# plot(imu$z_vel, main="IMU Z Velocity Readings", sub="Stationary")
# plot(imu$x_acc, main="IMU X Acceleration Readings", sub="Stationary")
# plot(imu$y_acc, main="IMU Y Acceleration Readings", sub="Stationary")
# plot(imu$z_acc, main="IMU Z Acceleration Readings", sub="Stationary")
#
# yaw <- fitdist(imu$yaw, "norm", method="mme")
# x_vel <- fitdist(imu$x_vel, "norm", method="mme")
# y_vel <- fitdist(imu$y_vel, "norm", method="mme")
# z_vel <- fitdist(imu$z_vel, "norm", method="mme")
# x_acc <- fitdist(imu$x_acc, "norm", method="mme")
# y_acc <- fitdist(imu$y_acc, "norm", method="mme")
# z_acc <- fitdist(imu$z_acc, "norm", method="mme")
#
# summary(yaw)
# summary(x_vel)
# summary(y_vel)
# summary(z_vel)
# summary(x_acc)
# summary(y_acc)
# summary(z_acc)
#
# plot(yaw)
# plot(x_vel)
```

```
# plot(y_vel)
# plot(z_vel)
# plot(x_acc)
# plot(y_acc)
# plot(z_acc)
```