HW#3

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```
# Load the data
library(faraway)
tg <- faraway::teengamb
```

Part a

```
#Fit the first model
lm1 <- lm(gamble ~ sex + status + income + verbal, data = tg)
# Create the design matrices and hat matrices
X <- model.matrix(lm1)
X1 <- X[,1]
H <- X%*%solve(t(X)%*%X)%*%t(X)
H1 <- X1%*%solve(t(X1)%*%X1)%*%t(X1)
# Define y
y = tg$gamble
# Compute yhat
yhat <- H%*%y
# Compute ybar
ybar <- H1%*%y
# Compute SSR and SST
SSR <- t(yhat - ybar)%*%(yhat - ybar)
SST <- t(y - ybar)%*%(y - ybar)
# Compute r squared
rsqrt <- SSR/SST
rsqrt
```

```
##           [,1]
## [1,] 0.5267234
```

Part b

```
# Compute the residual
tg$r = y - yhat
# Find what is the maximal residual value
rmax = max(tg$r)
rmax
```

```
## [1] 94.25222
```

```
# Find which case has largest residual
which(tg$r == rmax)
```

```
## [1] 24
```

Part c

```
# Find the mean of the residuals
mean(tg$r)
```

```
## [1] -1.359206e-14
```

```
# Find the merdian of the residuals
median(tg$r)
```

```
## [1] -1.451392
```

Part d

```
# Plot the residuals against the fitted values
plot(tg$r,tg$fitted)
```