HwMod08

```
library(MASS)
```

```
## Warning: package 'MASS' was built under R version 4.4.3
```

```
library(tidyverse)
```

```
## Warning: package 'purrr' was built under R version 4.4.3
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.0.4
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## x dplyr::select() masks MASS::select()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(lawstat)
```

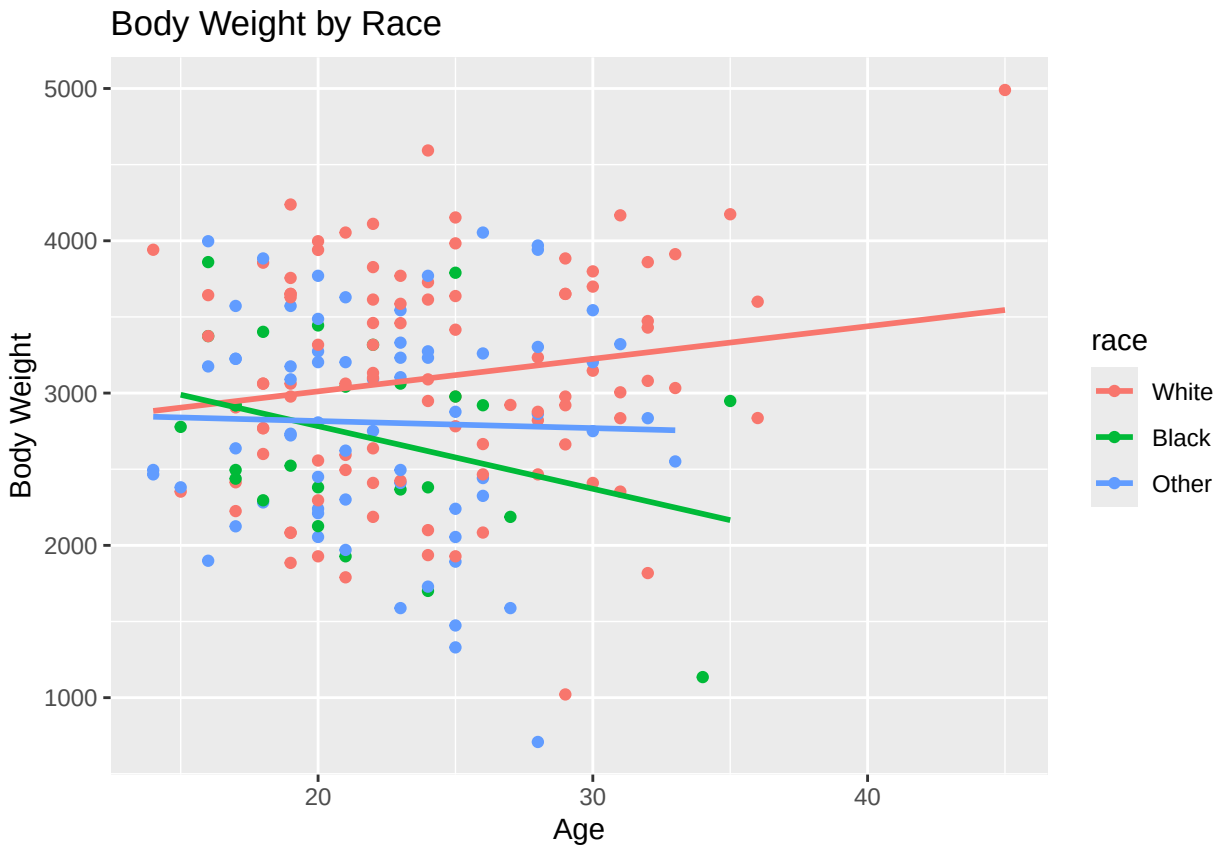
```
## Warning: package 'lawstat' was built under R version 4.4.3
```

```
data<-birthwt
weight<-birthwt
weight$race <- factor(weight$race,
                      levels = c(1, 2, 3),
                      labels = c("White", "Black", "Other"))
```

1(a)

```
ggplot(weight, aes(x=age,y=bwt, color=race))+
  geom_point()+
  geom_smooth(method=lm, se=FALSE)+
  labs(x="Age",
  y="Body Weight",
  title="Body Weight by Race")
```

```
## `geom_smooth()` using formula = 'y ~ x'
```



You can see an interaction effect, after cleaning the data where it can appropriately compare data. This effect is noticeable because of the differing lines of fit with different slopes dependent on race.

1(b)

```
contrasts(weight$race)
```

```
##       Black Other
## White     0     0
## Black     1     0
## Other     0     1
```

```
complete_data <- birthwt[complete.cases(birthwt$bwt, birthwt$age, birthwt$race), ]
table(complete_data$race)
```

```
##
##  1  2  3
## 96 26 67
```

```
model <- lm(bwt ~ age * race, data = weight)
summary(model)
```

```
##
```

```
## Call:
## lm(formula = bwt ~ age * race, data = weight)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2182.35  -474.23    13.48   523.86  1496.51
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2583.54     321.52   8.035 1.11e-13 ***
## age              21.37      12.89   1.658   0.0991 .
## raceBlack      1022.79     694.21   1.473   0.1424
## raceOther       326.05     545.30   0.598   0.5506
## age:raceBlack   -62.54      30.67  -2.039   0.0429 *
## age:raceOther   -26.03      23.20  -1.122   0.2633
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 710.7 on 183 degrees of freedom
## Multiple R-squared:  0.07541,    Adjusted R-squared:  0.05015
## F-statistic: 2.985 on 5 and 183 DF,  p-value: 0.01291
```

In this equation it shows that based on the race, there is a different interaction. The interaction term shows age has a differing effect across the different racial categories. It also suggests there is a weaker positive relationship between age and birth weight across the different non-White racial groups. Particularly, there is a significant negative interaction for black mothers and their babies body weight in relation to age with a slope of -62.54, lower than the reference slope of 21.37.