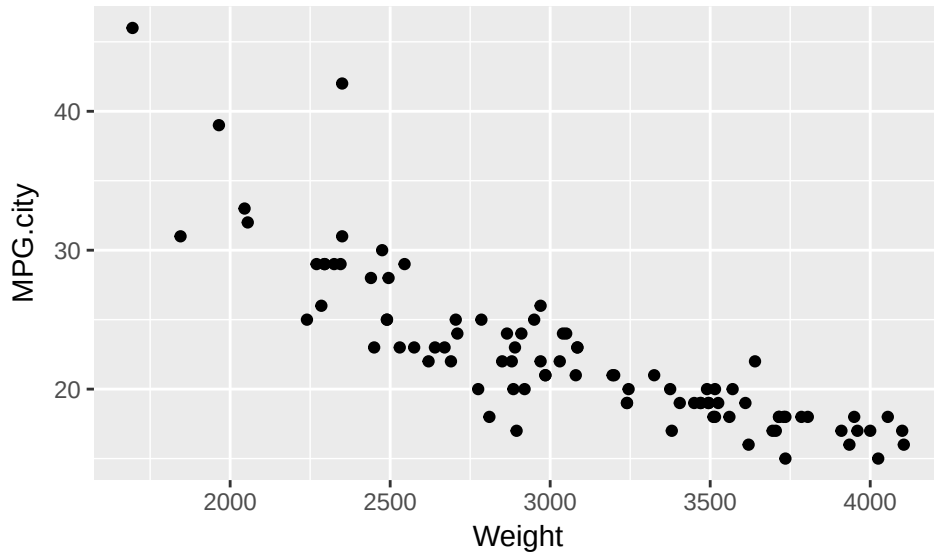
Linear Models, Spring 2018
Hardin, Warm-up # 1

Name: _____

Consider the following ANOVA table. The data are based on a random sample of cars from among 1993 passenger car models that were listed in both *Consumer Reports* and the *PACE Buying Guide*. We are considering the variables weight and MPG.city.




```
anova(lm(MPG.city~Weight, data=Cars93))

## Analysis of Variance Table
##
## Response: MPG.city
##           Df  Sum Sq Mean Sq F value    Pr(>F)
## Weight     1 2065.52 2065.52  223.75 < 2.2e-16 ***
## Residuals 91  840.05    9.23
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

broom::tidy(anova(lm(MPG.city~Weight, data=Cars93)))

##        term df     sumsq      meansq statistic      p.value
## 1    Weight  1 2065.5191 2065.519112   223.751 2.967048e-26
## 2 Residuals 91  840.0508    9.231327        NA           NA
```

1. Find R^2.
2. Interpret R^2.

Solution

1.
```r
anova.cars = anova(lm(MPG.city~Weight, data=Cars93))
anova.cars[1,2]

## [1] 2065.519

anova.cars[2,2]

## [1] 840.0508

r2.cars = anova.cars[1,2] / (anova.cars[1,2] + anova.cars[2,2])
r2.cars

## [1] 0.7108826
```

   Check:

```r
glance(lm(MPG.city~Weight, data=Cars93))

##   r.squared adj.r.squared   sigma statistic      p.value df    logLik
## 1 0.7108826     0.7077055 3.03831   223.751 2.967048e-26  2 -234.3014
##        AIC      BIC deviance df.residual
## 1 474.6028 482.2006 840.0508          91
```

2. 71.09% of the variability in the MPG that a car gets in the city can be explained by the linear model with weight of the car.