

# Quiz 2

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```
x <- c(0.61, 0.93, 0.83, 0.35, 0.54, 0.16, 0.91, 0.62, 0.62)
y <- c(0.67, 0.84, 0.6, 0.18, 0.85, 0.47, 1.1, 0.65, 0.36)

model1 <- lm(y~x)
summary(model1)

##
## Call:
## lm(formula = y ~ x)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.27636 -0.18807  0.01364  0.16595  0.27143
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   0.1885     0.2061   0.914   0.391
## x             0.7224     0.3107   2.325   0.053 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.223 on 7 degrees of freedom
## Multiple R-squared:  0.4358, Adjusted R-squared:  0.3552
## F-statistic: 5.408 on 1 and 7 DF, p-value: 0.05296

resid.sd <- sqrt(sum((model1$residuals)^2/(length(x)-2)))
resid.sd

## [1] 0.2229981

library(datasets)
data(mtcars)

model2 <- lm(mpg ~ wt, data = mtcars)
table <- summary(model2)$coefficients

yhat <- model2$coef[1] + model2$coef[2] * mean(mtcars$wt)
yhat + c(-1, 1) * qt(.975, df = model2$df) * summary(model2)$sigma / sqrt(length(mtcars$mpg))

## [1] 18.99098 21.19027

# Or:
predict(model2, newdata = data.frame(wt = mean(mtcars$wt)), interval = ("confidence"))

##           fit          lwr          upr
## 1 20.09062 18.99098 21.19027

predict(model2, newdata = data.frame(wt = 3), interval = ("prediction"))

##           fit          lwr          upr
```

```
## 1 21.25171 14.92987 27.57355
model3 <- lm(mpg ~ I(wt/2), data = mtcars)
summary(model3)$coefficients[2, 1] + c(-1, 1) * qt(.975, df = model3$df) * summary(model3)$coefficients

## [1] -12.97262 -8.40527
model4 <- lm(mpg~1, data = mtcars)

sum(summary(model3)$resid^2) / sum(summary(model4)$resid^2)

## [1] 0.2471672
model5 <- lm(mpg~wt - 1, data = mtcars)

sum(summary(model3)$resid)

## [1] -1.637579e-15
sum(summary(model4)$resid)

## [1] -5.995204e-15
sum(summary(model5)$resid)

## [1] 98.11672
```