Group8_LabHW1

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January 23, 2019

Lab/HW 1

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1. Using the Purity Data from Problem 2.7, calculate the estimates for the true slope and the true intercept using RMarkdown.
2. Calculate the estimate of the true error variance. Interpret.
3. Plot the data and the fitted simple linear regression line in one graph.
4. Verify (using R) Properties 1, 2, and 4, of the least squares fit.

```
# Reading in data
pd <- read.csv("C:\\Users\\Nick\\Documents\\0_Spring 2019\\Applied Regression\\Labs_HW\\Data_Sets\\Chap

# Assigning values
xi <- pd$purity

yi <- pd$hydro

pd
```

```
##    purity hydro
## 1   86.91  1.02
## 2   89.85  1.11
## 3   90.28  1.43
## 4   86.34  1.11
## 5   92.58  1.01
## 6   87.33  0.95
## 7   86.29  1.11
## 8   91.86  0.87
## 9   95.61  1.43
## 10  89.86  1.02
## 11  96.73  1.46
## 12  99.42  1.55
## 13  98.66  1.55
## 14  96.07  1.55
## 15  93.65  1.40
## 16  87.31  1.15
## 17  95.00  1.01
## 18  96.85  0.99
## 19  85.20  0.95
## 20  90.56  0.98
```

```
# Performing calculations
############################

# Estimating the true slope
Sxx <- sum(xi^2) - (sum(xi))^2 / length(xi)
```

```r
Sxy <- sum(xi * yi) - ((sum(xi) * sum(yi)) / length(xi))

b1 <- Sxy / Sxx
b1
```

```
## [1] 0.0329736
```

```r
# Estimating the true intercept
b0 <- mean(yi) - (b1 * mean(xi))
b0
```

```
## [1] -1.84507
```

```r
# Estimating true error variance
SSres <- sum((yi - mean(yi))^2) - (b1 * Sxy)

error <- SSres / (length(pd$purity) - 2)
error
```

```
## [1] 0.03614274
```

Purity Data Plot

$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x$