

Are we teaching the course



backwards??

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Williams College
ECOTS May 2012

WHAT WOULD YOU DO WITH ALL THIS DATA?

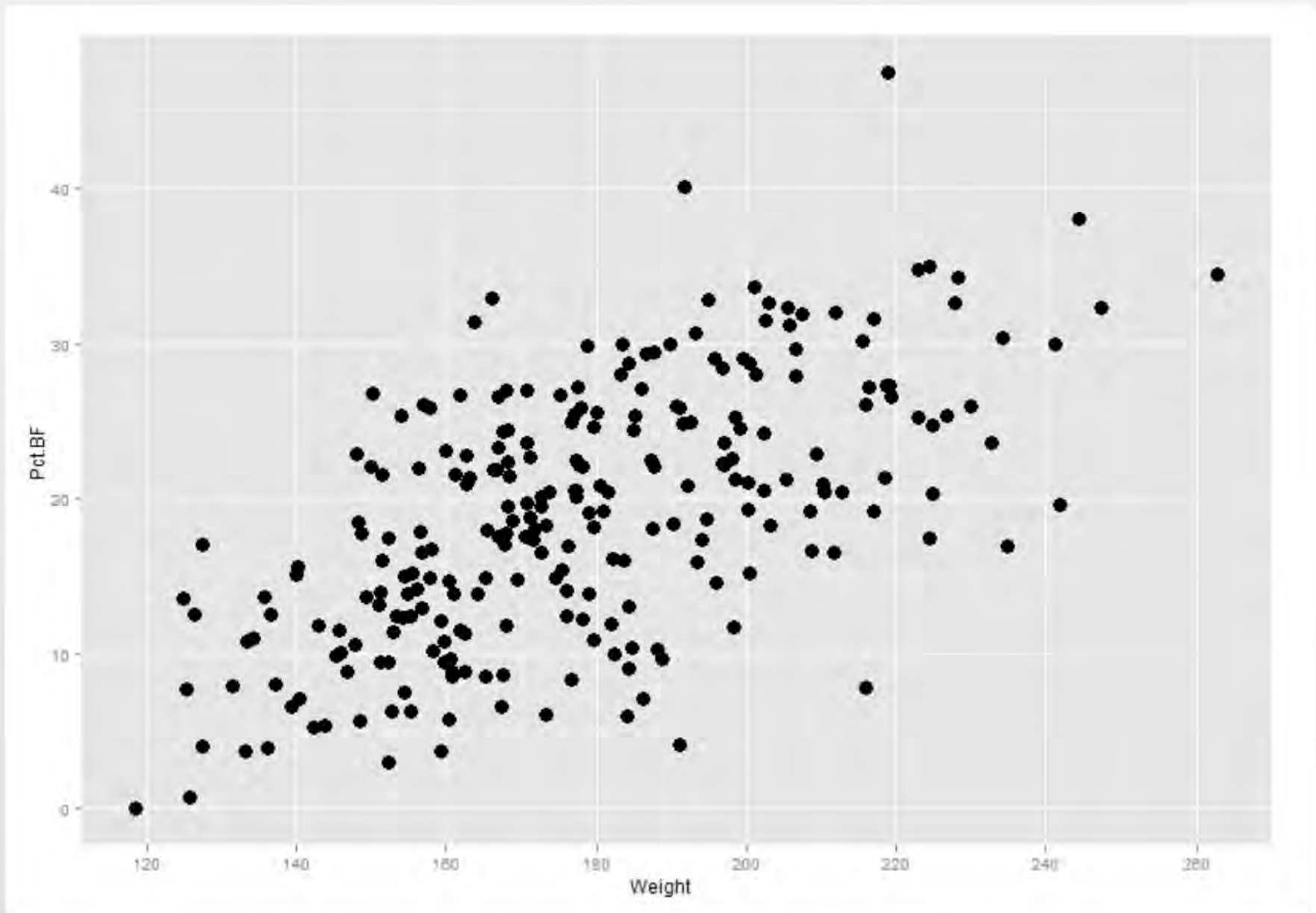


Mathematics and statistics provide the tools to understand ever-increasing amounts of data. To learn more, visit the Mathematics Awareness Month website and enter for a chance to win an iTunes gift card at www.mathaware.org.

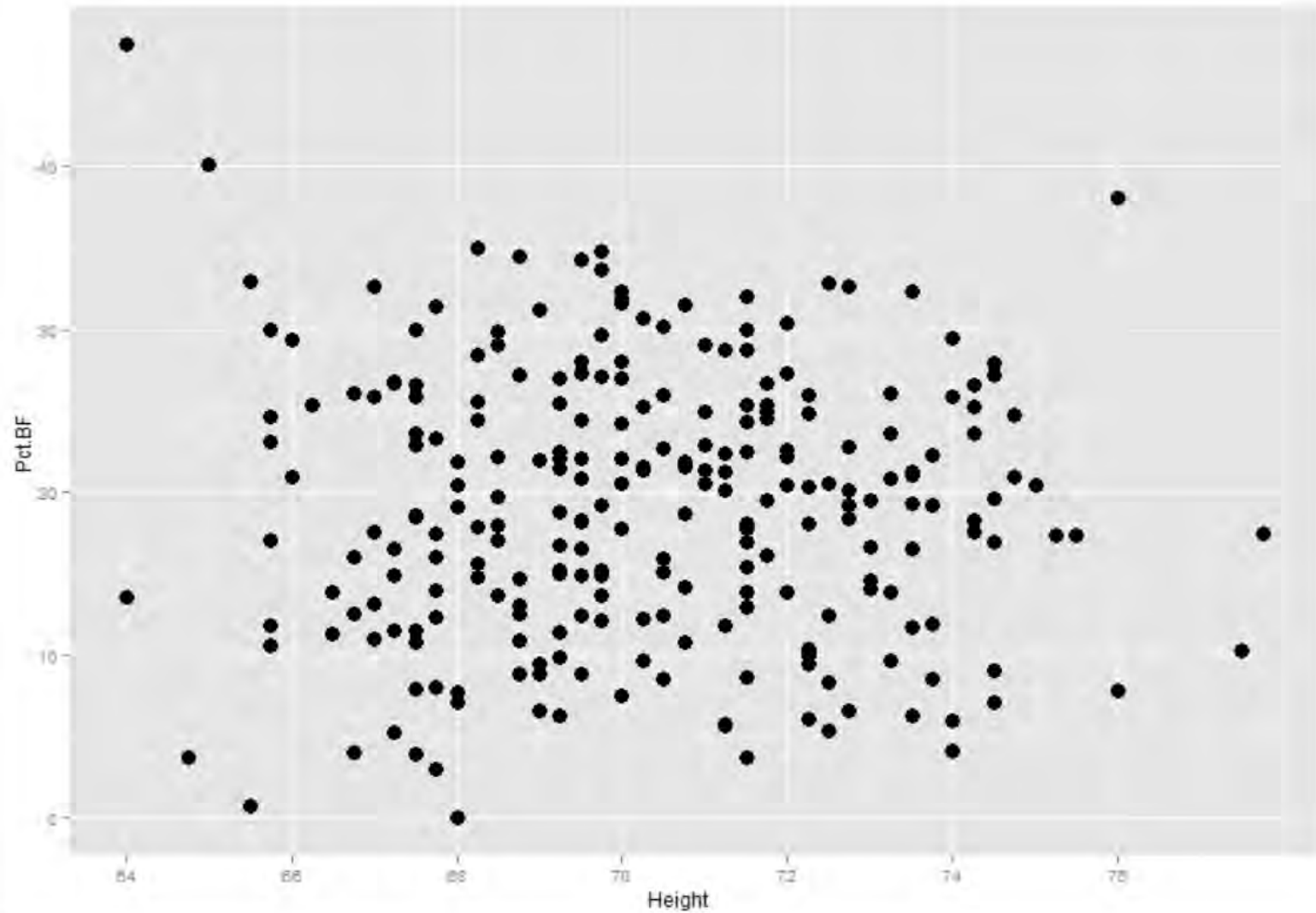


Mathematics, Statistics, and the Data Deluge MATHEMATICS AWARENESS MONTH

Sponsored by the Joint Policy Board for Mathematics—American Mathematical Society, American Statistical Association, Mathematical Association of America, Society for Industrial and Applied Mathematics

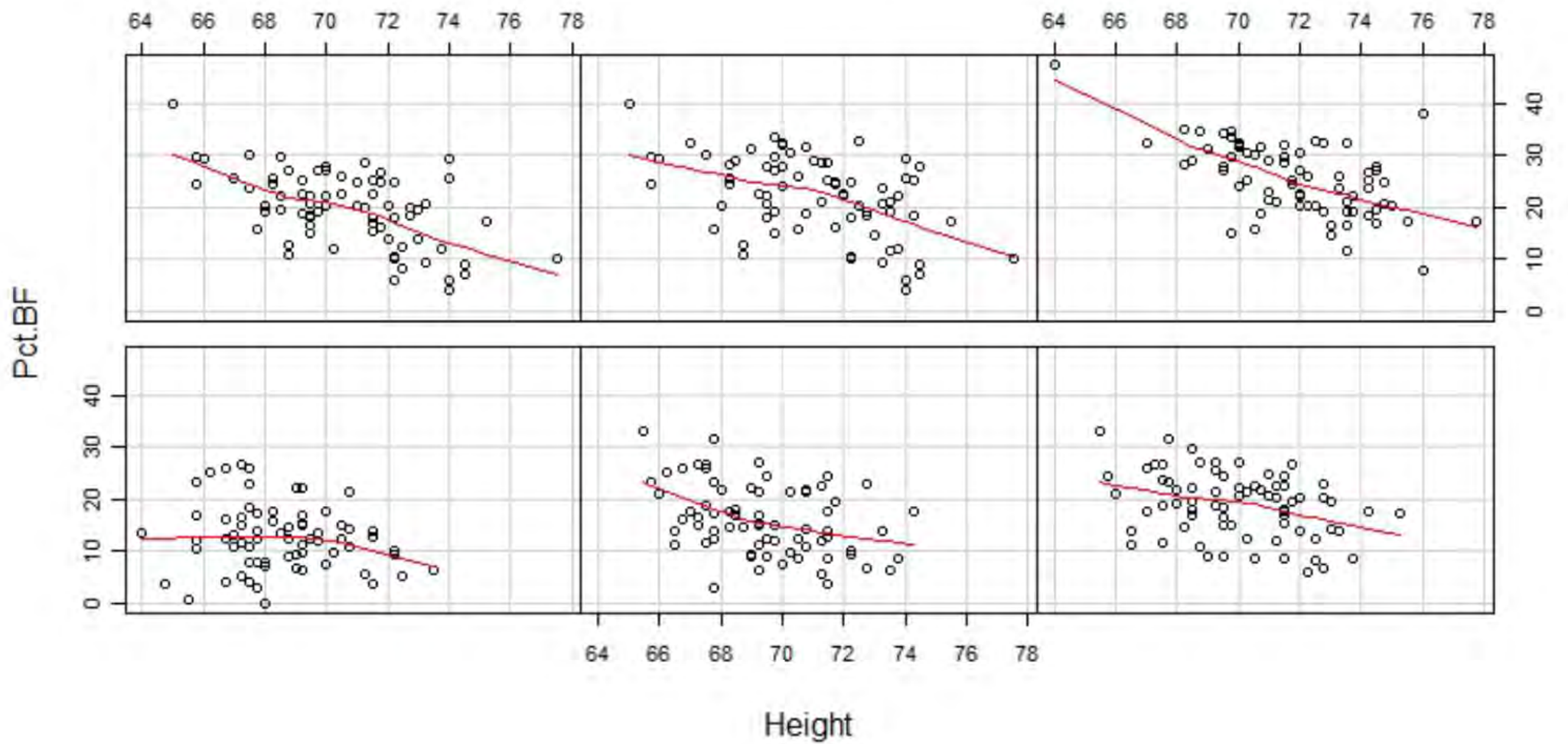
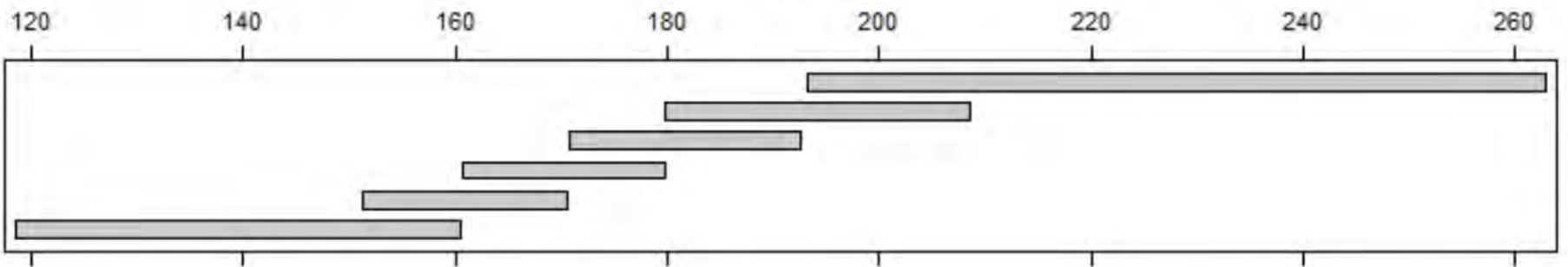


Not a surprise



Is this a surprise?

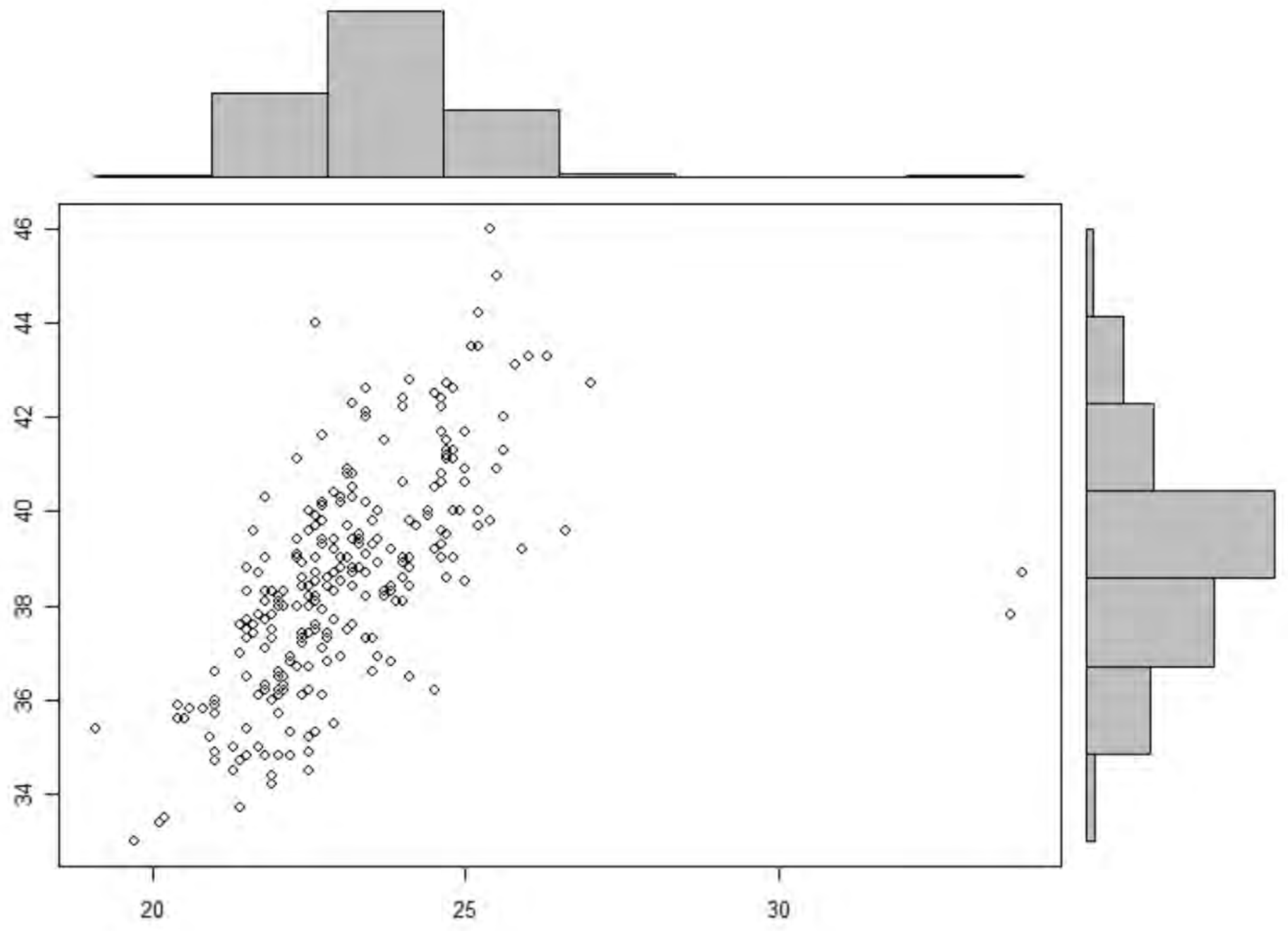
Given : Weight

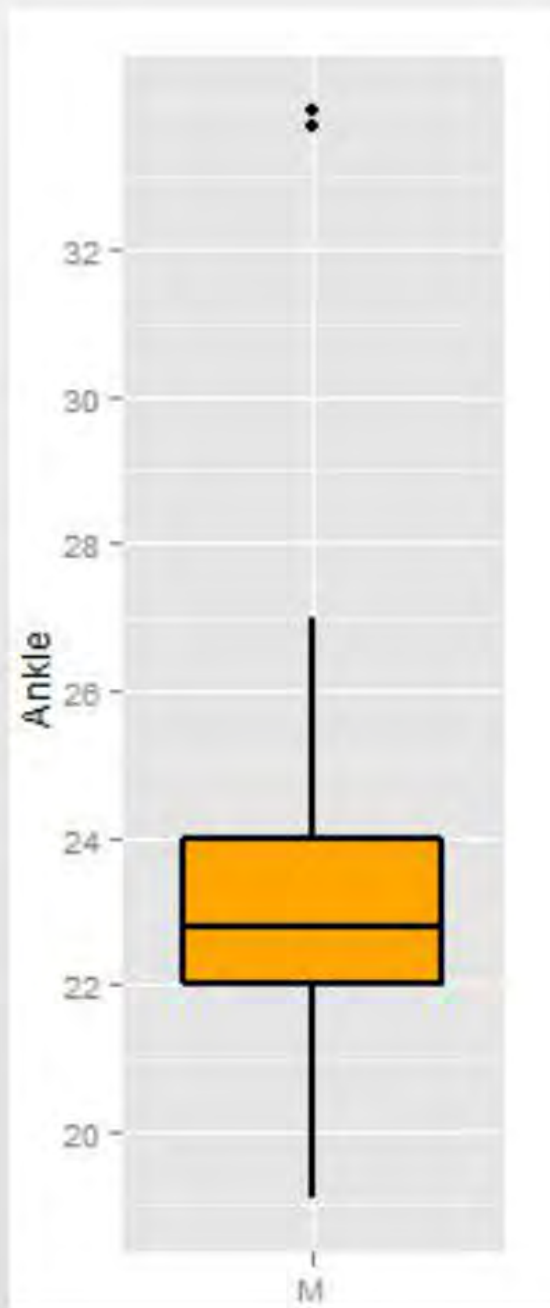


Statistical Modeling

A Fresh Approach

Daniel T. Kaplan



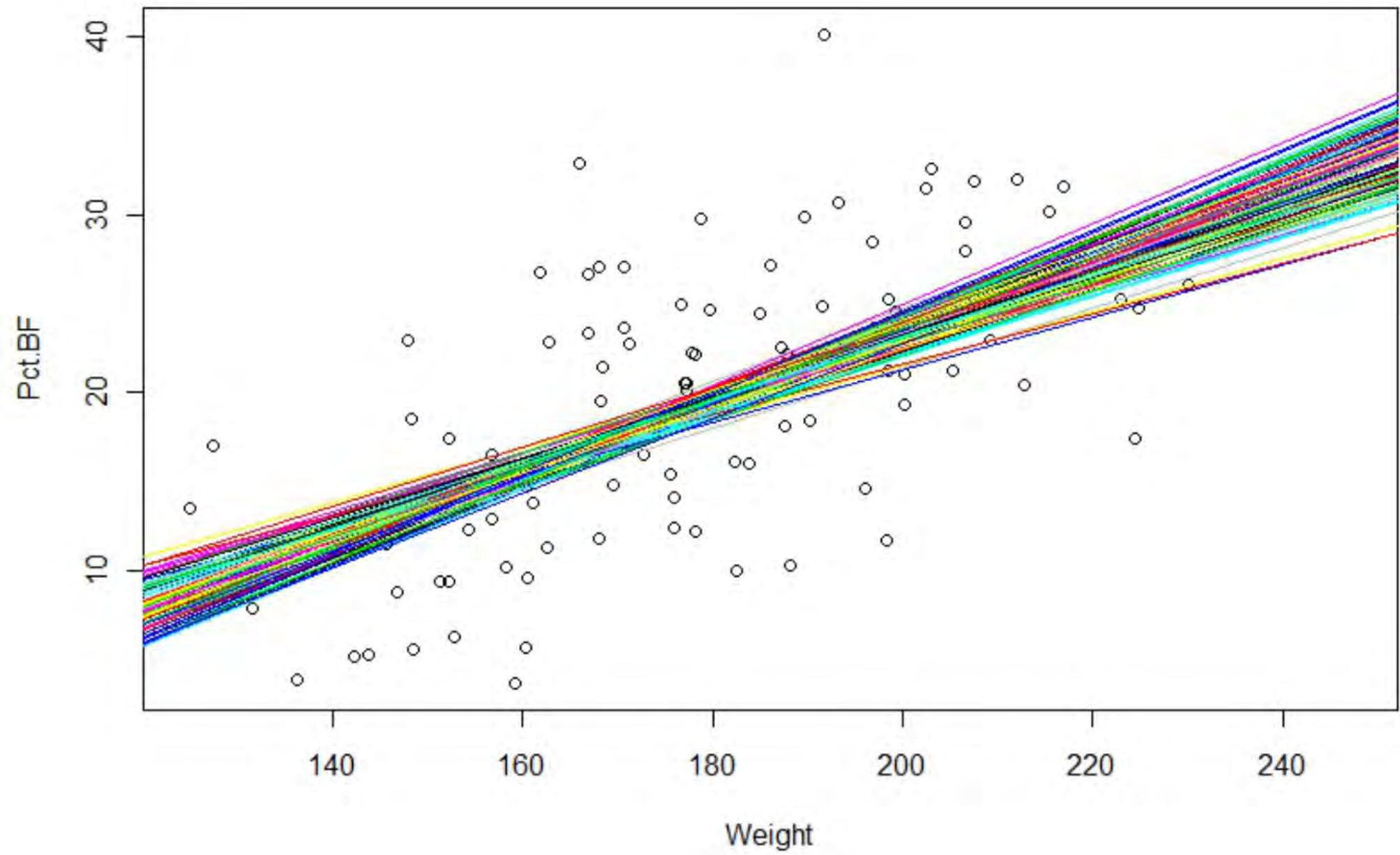


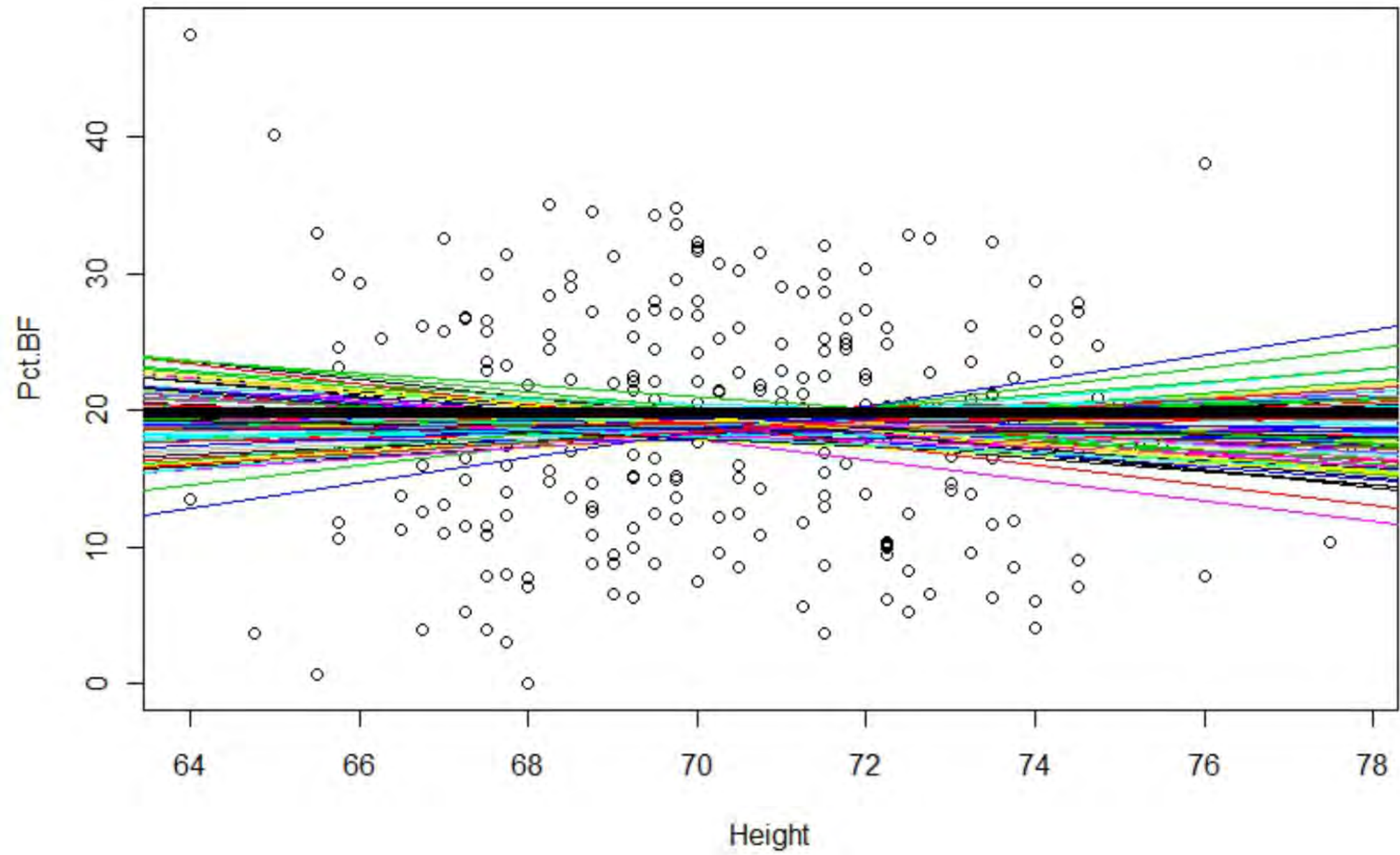
How far is far?
Why summarize?

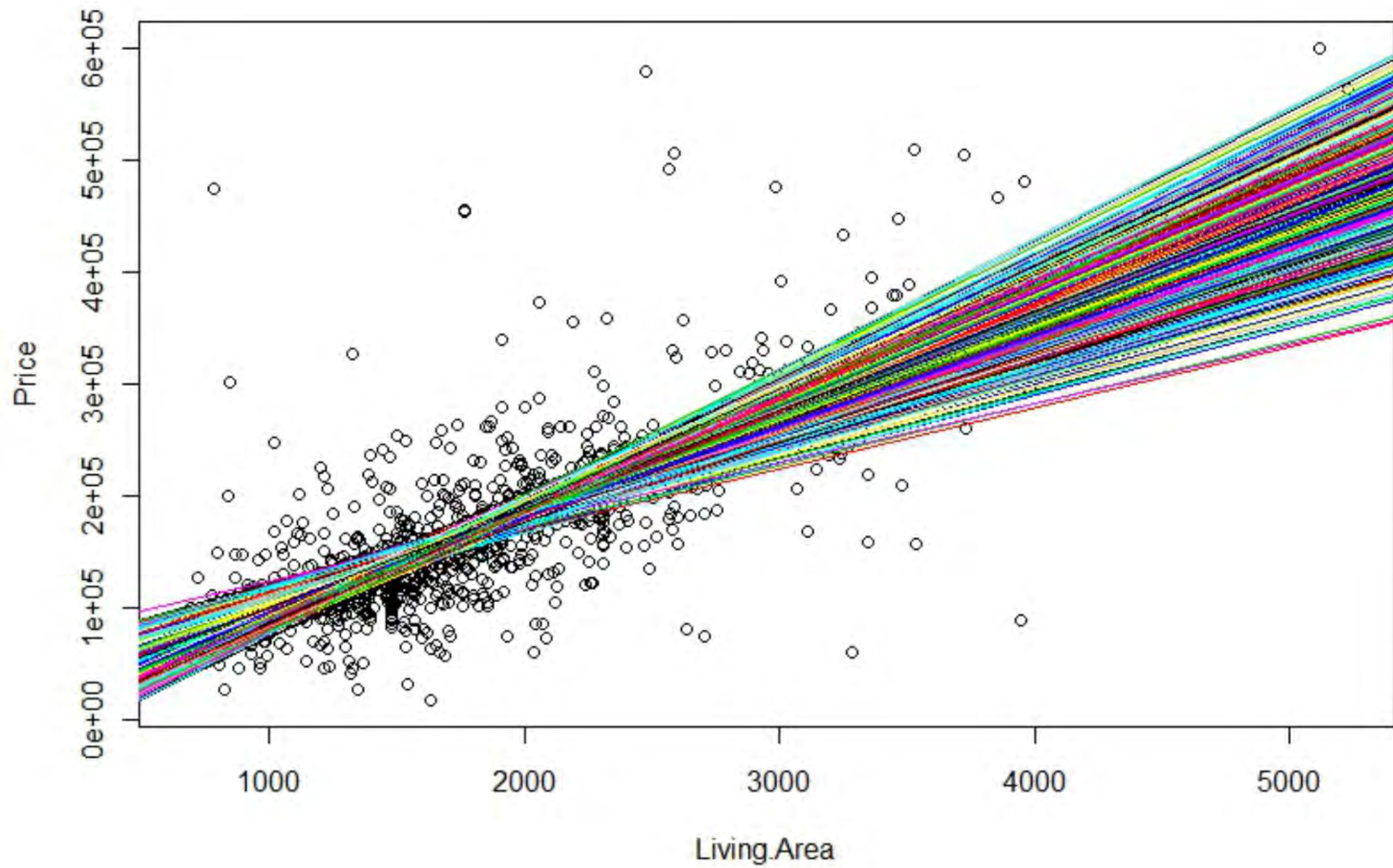
Summarize

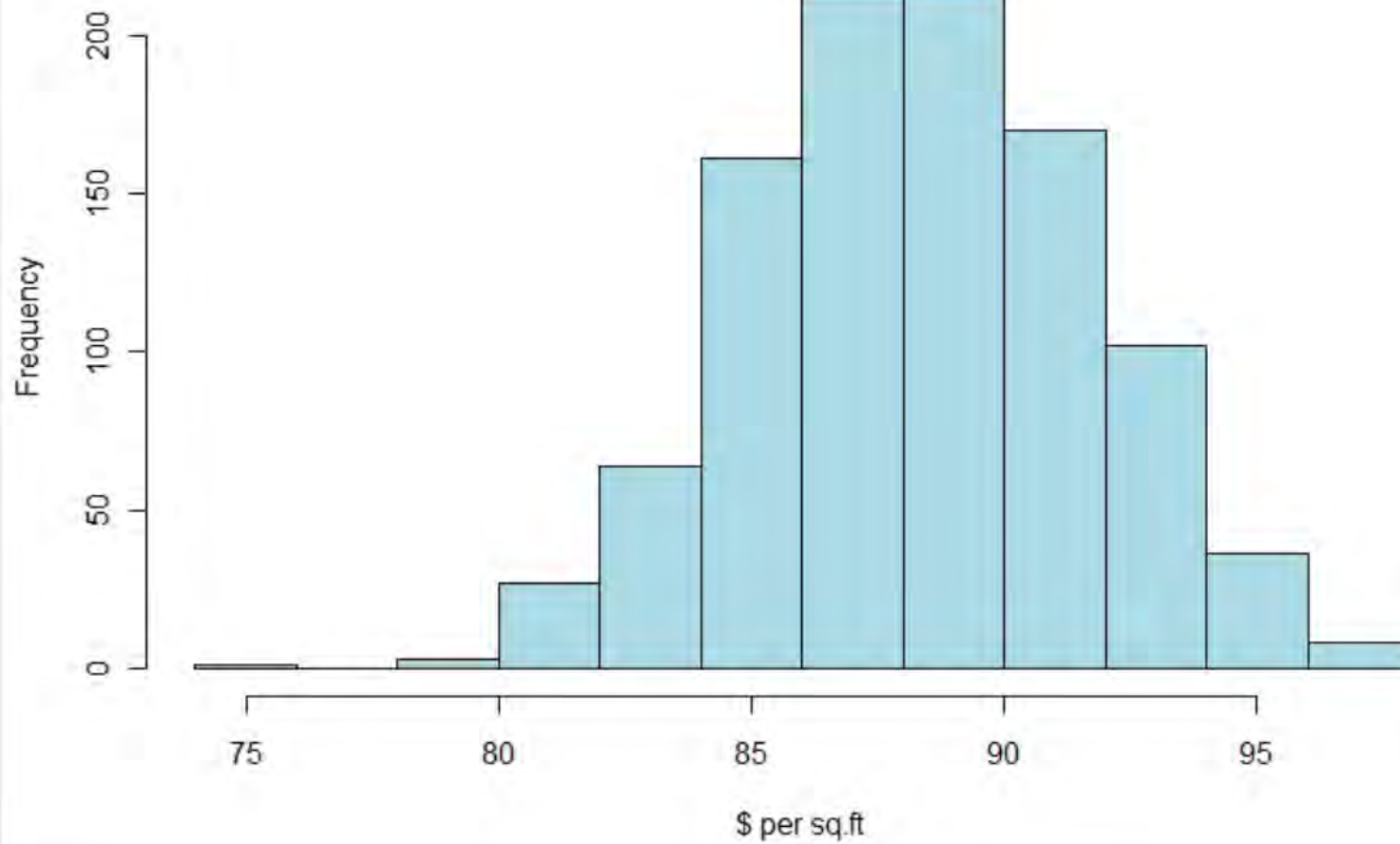
- Mean, median
- SD, IQR
- z-score
- correlation

What about inference?









```
quantile(slopes.real2[,2],c(0.025,0.975))
```

2.5%	97.5%
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\$81.79	\$94.87
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140

160

180

200

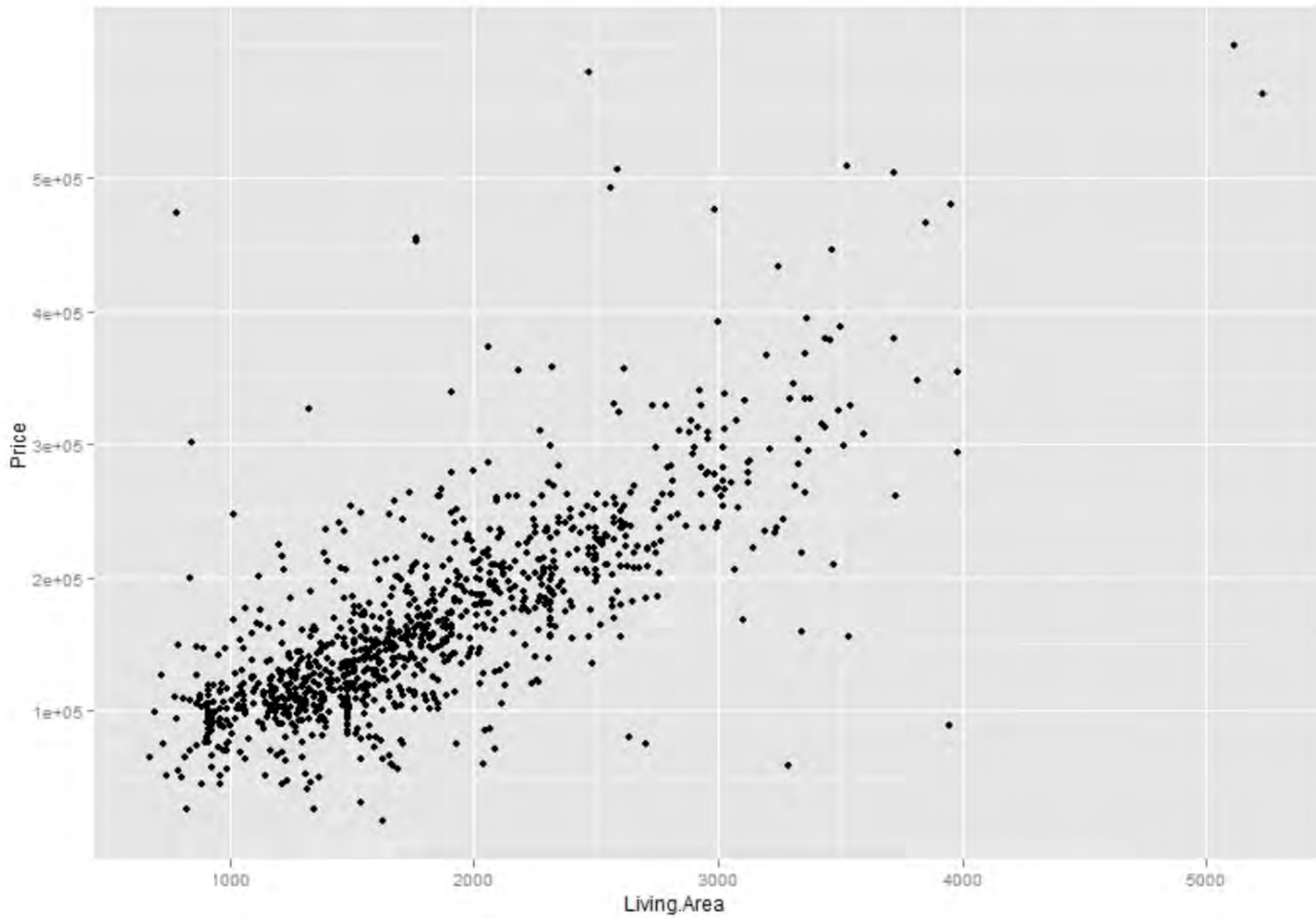
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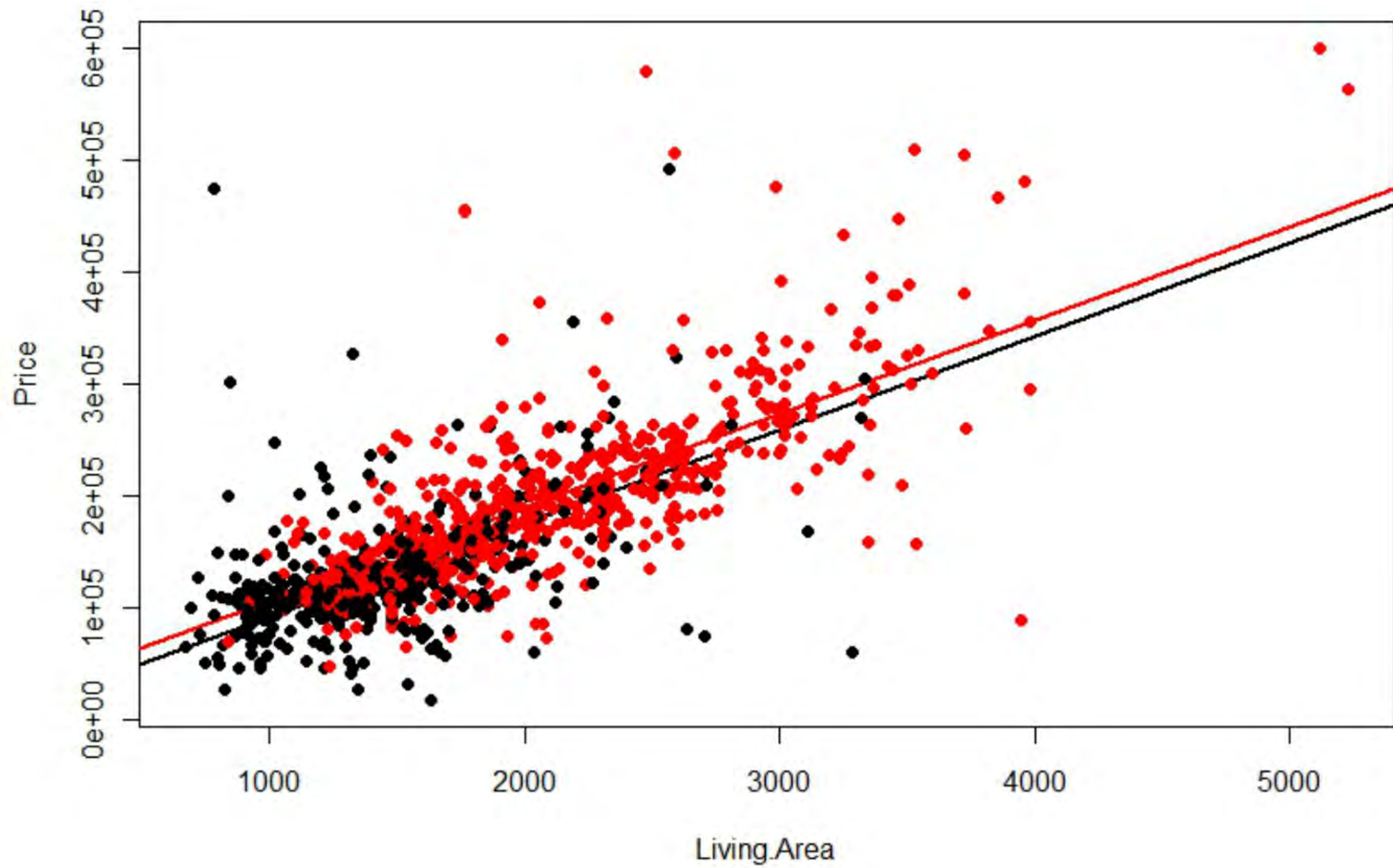
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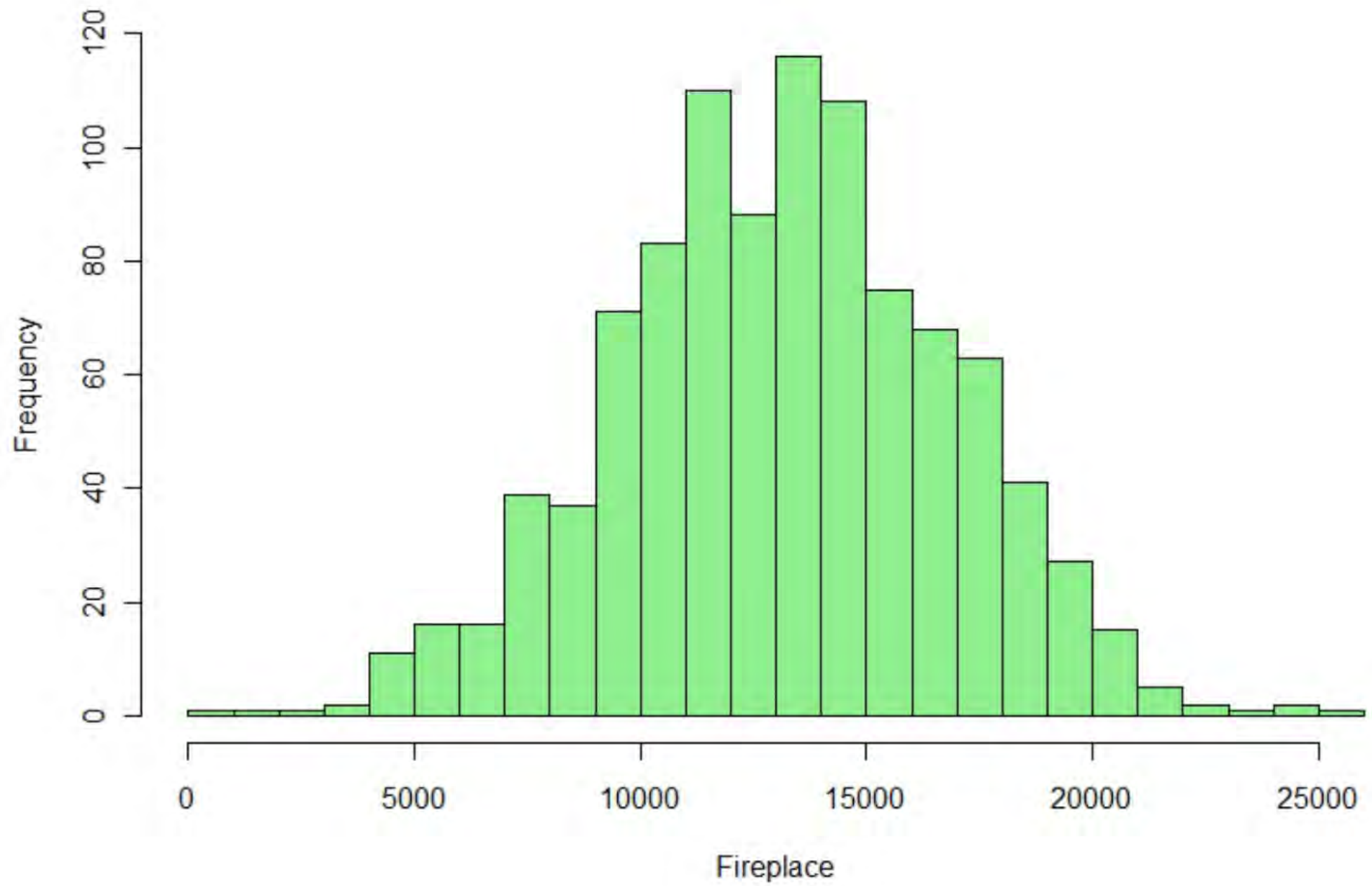
Weight

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	7239.281	4520.340	1.601	0.11
Living.Area	88.301	2.334	37.826	<2e-16 ***



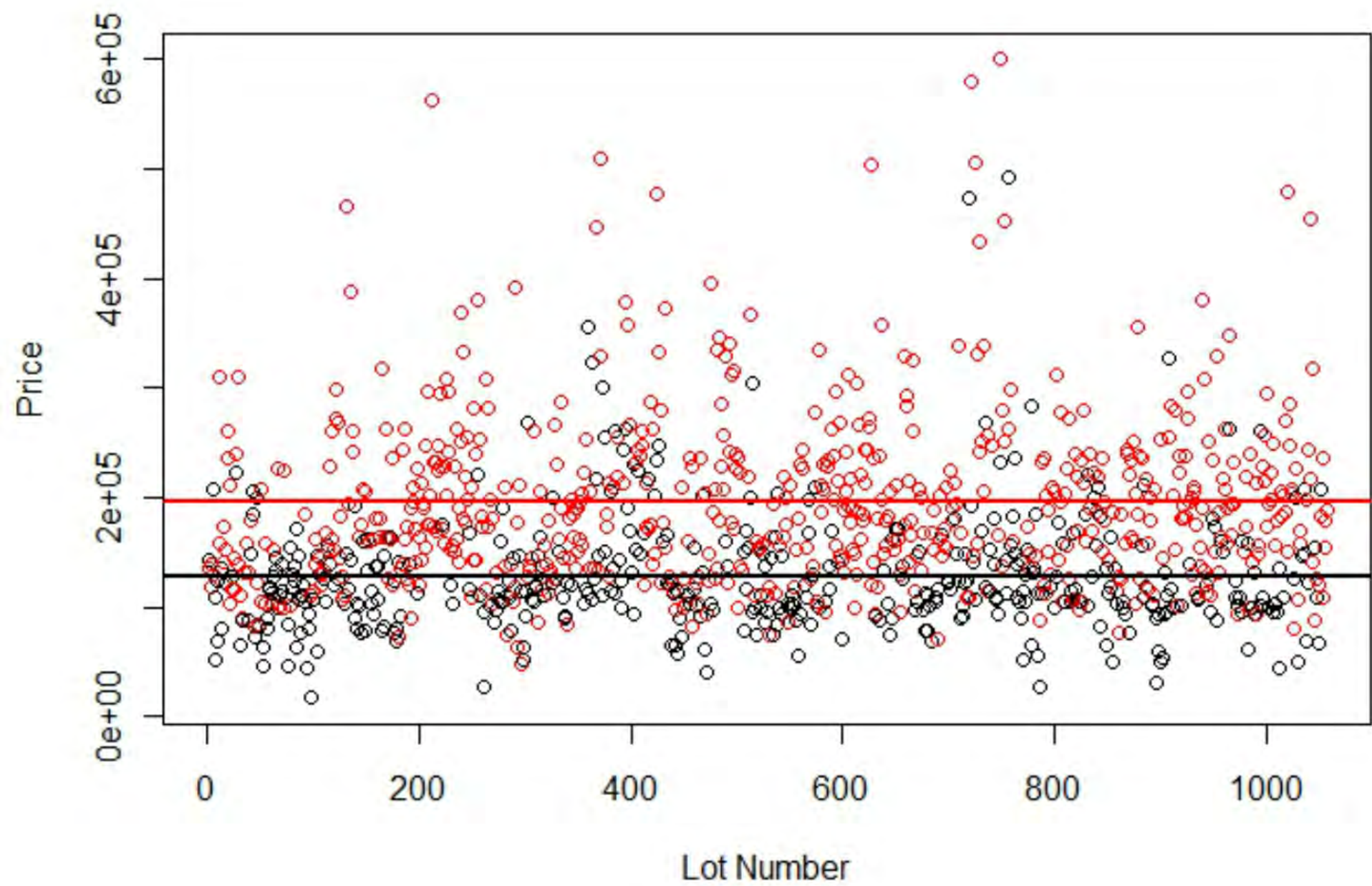




lm(formula = Price ~ Living.Area + Fire, data = real.1057)

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	7884.182	4496.766	1.753	0.079841 .
Living.Area	83.631	2.641	31.661	< 2e-16 ***
FireTRUE	13194.865	3565.634	3.701	0.000226 ***



```
> t.test(Price~Fire,real.1057)
```

Welch Two Sample t-test

data: Price by Fire

t = -16.3597, df = 1053.537, p-value < 2.2e-16

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-75180.67 -59077.48

sample estimates:

mean in group FALSE mean in group TRUE

127954.7

195083.7

Start with the big picture

- Real problems
- Complex relationships
- Get students to ask questions

Challenges

- Adapt to student backgrounds
- Organization of material
- Proportions
- Probability concepts