STAT 578 - Advanced Bayesian Modeling - Fall 2019
Assignment 4

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Solution for Problem (a)

(i)

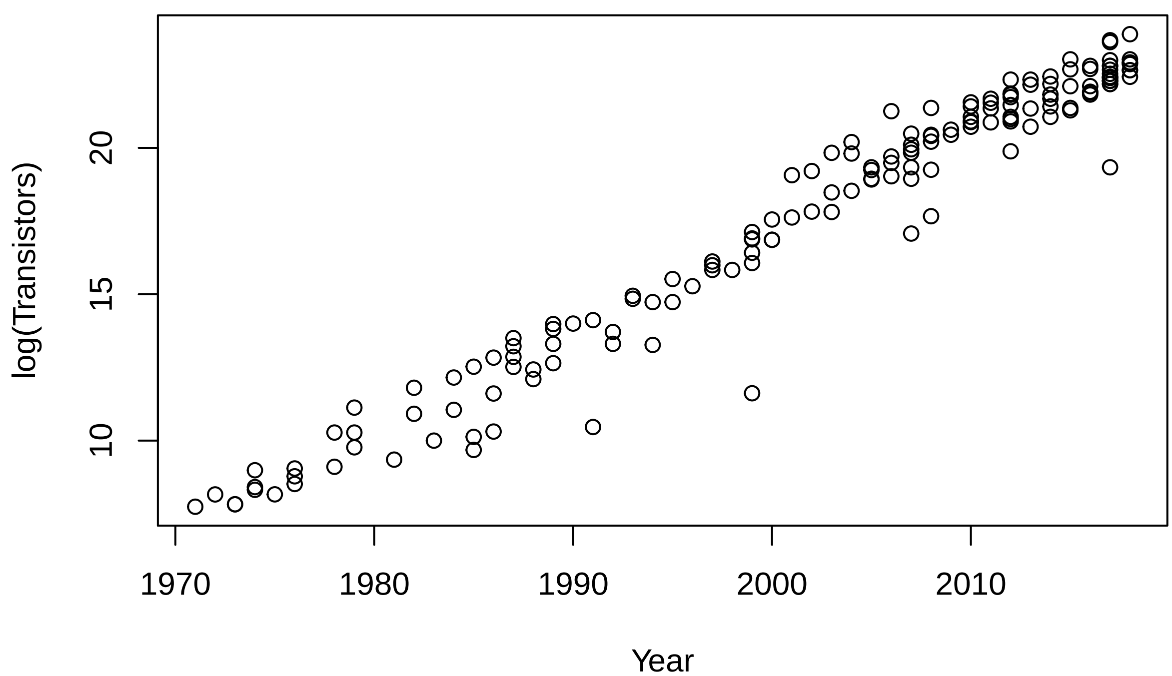
According to the formular for Moore's law and take log on T, we get:

$log(T) \approx log(C) + 0.5 * log(2) * A \rightarrow log(T) \approx log(C) + 0.3465736 * A$

This is the form of linear regression that make logT as response variable and A as explanatory variable. `log(C)` is the intercept and coefficient of A is 0.3465736. Thus we can say logT is roughly follow a simple linear regression on A.

(ii)

```
moores_df = read.csv("mooreslawdata.csv", header=TRUE)
with(moores_df, plot(log(Transistors) ~ Year))
```



Solution for Problem (b)

```r
moores_model = lm(log(Transistors) ~ Year, data = moores_df)
summary(moores_model)
```

```
##
## Call:
## lm(formula = log(Transistors) ~ Year, data = moores_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -5.0598 -0.4443  0.0891  0.6052  2.1820
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -6.672e+02  1.088e+01  -61.30   <2e-16 ***
## Year         3.421e-01  5.436e-03   62.93   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9395 on 159 degrees of freedom
## Multiple R-squared:  0.9614, Adjusted R-squared:  0.9612
## F-statistic:  3960 on 1 and 159 DF,  p-value: < 2.2e-16
```

We built a classical linear regression model using `Year` (for A) as explanatory variable and `log(Transistors)` (for logT) as response variable. The summary shows that this model acheived good R-squared value (> 0.95), thus we can say logT is roughly follow a simple linear regression on A. The coefficient of A is 0.3421216

Solution for Problem (c)

Solution for Problem (d)