Homework 8 Redo

Nooreen Dabbish

January 9, 2015

1 Example of Org-Babel for R Literate Programming

1.1 R text output

A simple summary.

```
plot(matrix(rnorm(100), ncol=2), type="l")
```

```
x <- 1:10
library(ascii)
options(asciiType="org")
ascii(summary(table(1:4, 1:4)))
```

```
 - Number of cases in table: 4
 - Number of factors: 2
 - Test for independence of all factors:
   - Chisq = 12, df = 9, p-value = 0.2133
   - Chi-squared approximation may be incorrect
```

1.2 R graphics output

Note we use the object `x` generated in previous code block, thanks to the header option `:session *R*`. The output graphics file is `a.png`.

Same plot with larger dimension:

2 Problem 1

$\mu_0 = 3.35$ percent butterfat
$\sigma = 0.15$

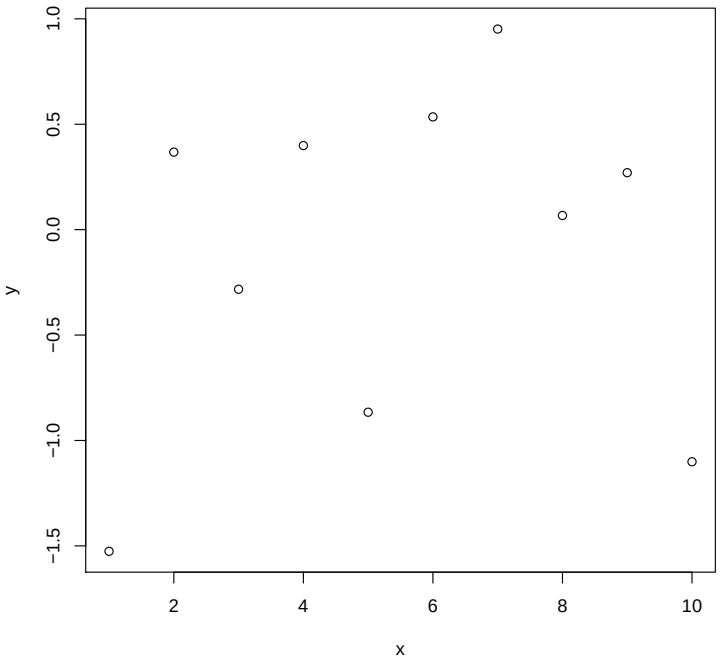


Figure 1: Scatter Plot with Regression Line

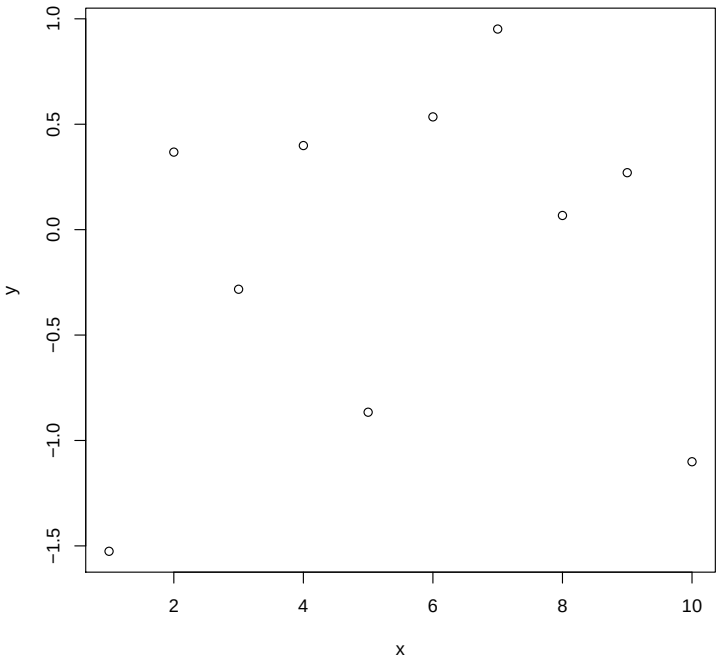


Figure 2: Scatter Plot with Regression Line

2.1 Find the rejection region at the significance level $\alpha = 0.05$

$\mathrm{H}_0 : \mu = \mu_0 = 3.35$
$H_A : \mu \neq \mu_0$
$\alpha = \mathrm{P}(\mathrm{Accept} H_0 \mid H_0 \mathrm{true})$
$= \mathrm{P}(z_{\frac{\alpha}{2}} < Z < z_{1-\frac{\alpha}{2}} \mid \mu = \mu_0)$
$(= SRC_R[: exportsresultsraw] round(qnorm(.025), 2) =< Z <= 1.96 =)$ y
(-1.96< Z < 1.96)

3 Problem 2

3.1 Data for Yatch Race

Yacht	Year	Days	Hours	Minutes	Time
Rani	1945	6	14	22	9502
Morna	1946	5	2	53	7373
Morna	1947	5	3	3	7383
Morna	1948	4	5	1	6061
WaltzingMatilda	1949	5	10	33	7833
MargaretRintoul	1950	5	5	28	7528
MargaretRintoul	1951	4	2	29	5909
Nocturne	1952	6	2	34	8794
Solveig	1953	5	7	12	7632
KurrewaIV	1954	5	6	9	7569
Even	1955	4	18	13	6853
KurrewaIV	1956	4	4	31	6031
KurrewaIV	1957	3	18	30	5430
Solo	1958	5	2	32	7352
Solo	1959	4	13	33	6573
KurrewaIV	1960	4	8	11	6251
Astor	1961	4	4	42	6042
Ondine	1962	3	3	46	4546
Astor	1963	4	10	53	6413
Astor	1964	3	20	5	5525
Stormvogel	1965	3	20	30	3930
Fidelis	1966	4	8	39	6279
PenDuickIII	1967	4	4	10	6010
OndineII	1968	4	30	20	7580
Crusade	1969	3	15	7	5227
Buccaneer	1970	3	14	6	5166
Kialoa	1971	3	12	46	5086
AmericanEagle	1972	3	4	42	4602
Helsal	1973	3	1	32	4412
OndineIII	1974	3	13	51	5151
Kialoa	1975	2	14	36	3756
Ballyhoo	1976	3	7	59	4799
KialoaII	1977	3	10	14	4934
Apollo	1978	4	2	23	5903
BumblebeeIV	1979	3	1	45	4425
NewZealand	1980	2	18	45	4005
Vengeance	1981	3	22	30	5670
CondorofBermuda	1982	6	3	0	59	4379
Condor	1983	3	0	50	4370
NewZealand	1984	3	11	21	5001
Apollo	1985	3	4	32	4592
CondorofBermuda	1986	2	23	26	4286
Sovereign	1987	2	21	58	4198
Ragamuffin	1988	3	15	29	5249
Drumbeat	1989	3	6	21	4701

3.2 Plot Histograms of Time and Log(Time-3100)

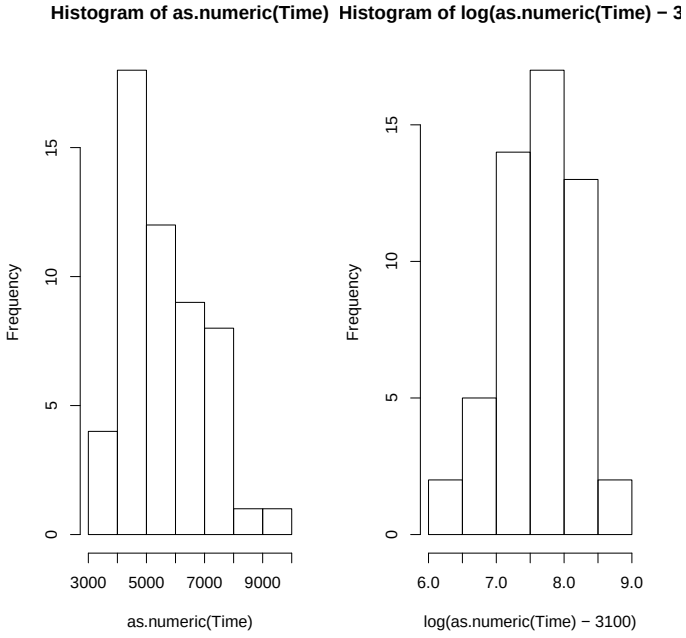
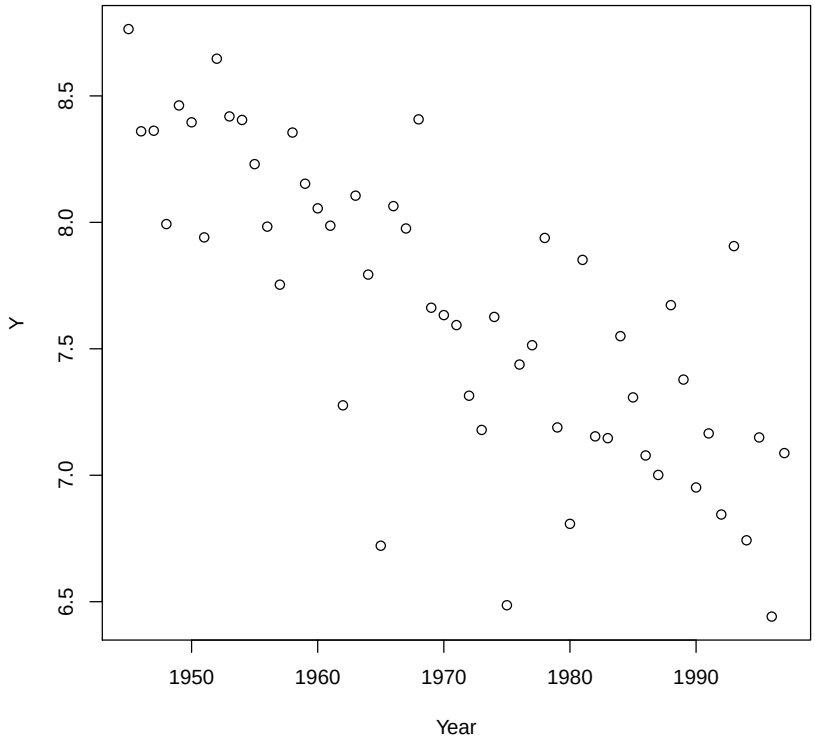


Figure 3: Histograms of Time and Log(Time - 3100)

3.3 Plot a scatterplot log(Time - 3100) vs. Year



3.3.1 Write out a linear model to study the relationship between log(Time - 3100) and Year.

Interpret your two parameters in the model.

Let $\mathrm{Y}_i = log(\mathrm{Time}_i - 3100)$

Model :$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$

$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$

$= \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sum(X_i - \bar{X})^2}$

$= -0.03$

$\hat{\beta}_0 = \bar{(Y)} - \hat{\beta}_1 \bar{X}$

$= 65.64$

Interpretation: β_0 tells us the value of Y when/if X equals 0. So in year 0, we would expect $\log(\mathrm{Time} - 3100)$ to be approximately 66. Solving

for Time gives `3.2226970275426e+28`.

β_1 tells us the magnitude of increase in $\log(\text{Time} - 3100)$ for a 1 year increase in time. Since β_0 is negative, it is actually a decrease. Solving for Time gives `3100.97`

4 Problem 3 Matrix Practice

1.00 -4.00
-3.00 0.00
2.00 -3.00