Acosta-Worksheet5

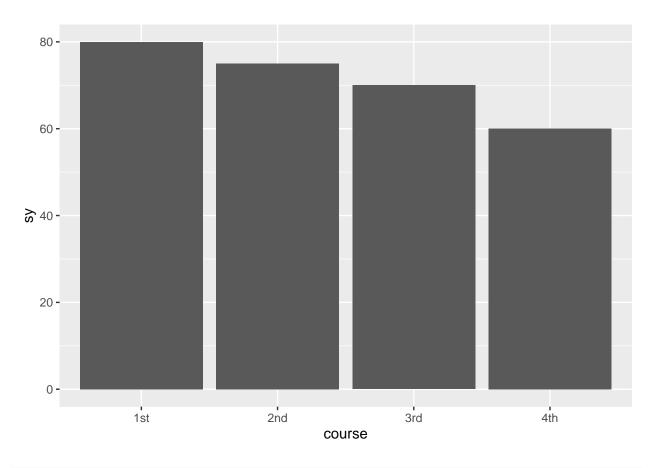
ACOSTA, MELBOURNE BSIT2A

2022-12-11

```
#1a
library(ggplot2)
```

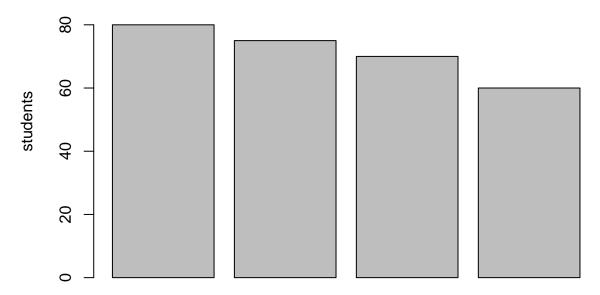
Warning: package 'ggplot2' was built under R version 4.2.2

```
df <- data.frame("course"=c("1st", "2nd", "3rd", "4th"), "sy"= c(80, 75, 70, 60))
ggplot(df) + geom_col(aes(course, sy))</pre>
```



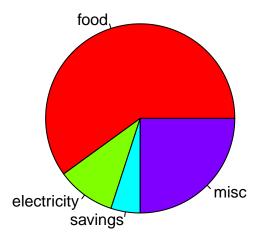
```
sy <- c(80, 75, 70, 60)
course <- c("1st", "2nd", "3rd", "4th")
```

Enrollment of BS Computer Science

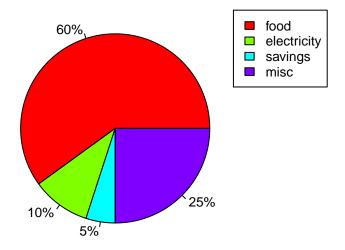


Curriculum Year

Expenses



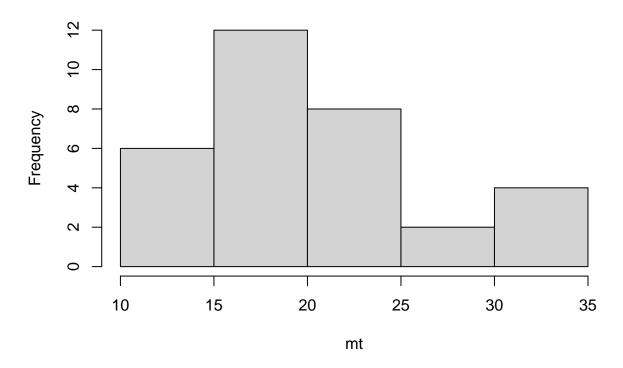
Expenses



```
#3
data("mtcars")

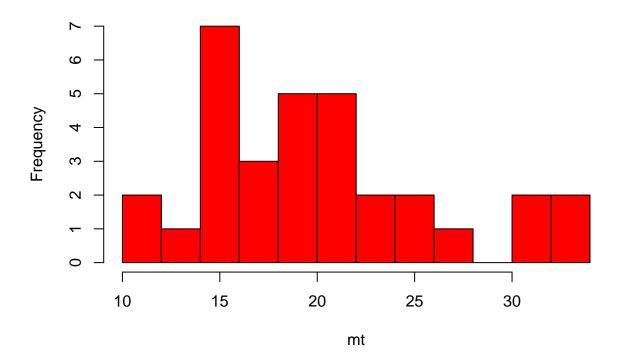
mt <- mtcars$mpg
hist(mt, main = "Histogram for mpg")</pre>
```

Histogram for mpg

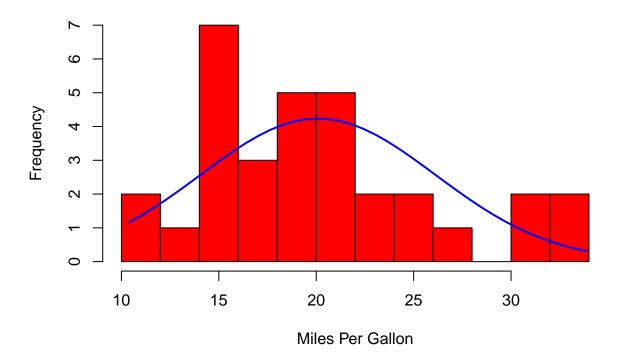


#B
hist(mt, breaks=12, col="red")

Histogram of mt



Histogram with Normal Curve



```
#D
data("iris")

data_a <- data.frame(iris)
data_a</pre>
```

## 1 5.1 3.5 1.4 0.2 setos: ## 2 4.9 3.0 1.4 0.2 setos: ## 3 4.7 3.2 1.3 0.2 setos: ## 4 4.6 3.1 1.5 0.2 setos: ## 6 5.4 3.9 1.7 0.4 setos: ## 7 4.6 3.4 1.4 0.3 setos: ## 8 5.0 3.4 1.5 0.2 setos: ## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##		Sonal Longth	Sonal Width	Potal Iongth	Dotal Width	Species
## 2				-	•		-
## 3	##	1	5.1	3.5	1.4	0.2	setosa
## 4 4.6 3.1 1.5 0.2 setos: ## 5 5.0 3.6 1.4 0.2 setos: ## 6 5.4 3.9 1.7 0.4 setos: ## 7 4.6 3.4 1.4 0.3 setos: ## 8 5.0 3.4 1.5 0.2 setos: ## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	2	4.9	3.0	1.4	0.2	setosa
## 5 5.0 3.6 1.4 0.2 setos: ## 6 5.4 3.9 1.7 0.4 setos: ## 7 4.6 3.4 1.4 0.3 setos: ## 8 5.0 3.4 1.5 0.2 setos: ## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	3	4.7	3.2	1.3	0.2	setosa
## 6 5.4 3.9 1.7 0.4 setos: ## 7 4.6 3.4 1.4 0.3 setos: ## 8 5.0 3.4 1.5 0.2 setos: ## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	4	4.6	3.1	1.5	0.2	setosa
## 7	##	5	5.0	3.6	1.4	0.2	setosa
## 8 5.0 3.4 1.5 0.2 setos: ## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	6	5.4	3.9	1.7	0.4	setosa
## 9 4.4 2.9 1.4 0.2 setos: ## 10 4.9 3.1 1.5 0.1 setos: ## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	7	4.6	3.4	1.4	0.3	setosa
## 10	##	8	5.0	3.4	1.5	0.2	setosa
## 11 5.4 3.7 1.5 0.2 setos: ## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	9	4.4	2.9	1.4	0.2	setosa
## 12 4.8 3.4 1.6 0.2 setos: ## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	10	4.9	3.1	1.5	0.1	setosa
## 13 4.8 3.0 1.4 0.1 setos: ## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	11	5.4	3.7	1.5	0.2	setosa
## 14 4.3 3.0 1.1 0.1 setos: ## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	12	4.8	3.4	1.6	0.2	setosa
## 15 5.8 4.0 1.2 0.2 setos: ## 16 5.7 4.4 1.5 0.4 setos:	##	13	4.8	3.0	1.4	0.1	setosa
## 16 5.7 4.4 1.5 0.4 setosa	##	14	4.3	3.0	1.1	0.1	setosa
	##	15	5.8	4.0	1.2	0.2	setosa
## 17 F A 2.0 1.0 0.4+	##	16	5.7	4.4	1.5	0.4	setosa
## 1/ 5.4 3.9 1.3 U.4 Setos:	##	17	5.4	3.9	1.3	0.4	setosa
## 18 5.1 3.5 1.4 0.3 setosa	##	18	5.1	3.5	1.4	0.3	setosa
## 19 5.7 3.8 1.7 0.3 setos	##	19	5.7	3.8	1.7	0.3	setosa

	•					
	20	5.1	3.8	1.5	0.3	setosa
##	21	5.4	3.4	1.7	0.2	setosa
##	22	5.1	3.7	1.5	0.4	setosa
##	23	4.6	3.6	1.0	0.2	setosa
##	24	5.1	3.3	1.7	0.5	setosa
##	25	4.8	3.4	1.9	0.2	setosa
##	26	5.0	3.0	1.6	0.2	setosa
##	27	5.0	3.4	1.6	0.4	setosa
##	28	5.2	3.5	1.5	0.2	setosa
##	29	5.2	3.4	1.4	0.2	setosa
##	30	4.7	3.2	1.6	0.2	setosa
##	31	4.8	3.1	1.6	0.2	setosa
##	32	5.4	3.4	1.5	0.4	setosa
##	33	5.2	4.1	1.5	0.1	setosa
##	34	5.5	4.2	1.4	0.2	setosa
##	35	4.9	3.1	1.5	0.2	setosa
##	36	5.0	3.2	1.2	0.2	setosa
##	37	5.5	3.5	1.3	0.2	setosa
##	38	4.9	3.6	1.4	0.1	setosa
##	39	4.4	3.0	1.3	0.2	setosa
##	40	5.1	3.4	1.5	0.2	setosa
##	41	5.0	3.5	1.3	0.3	setosa
##	42	4.5	2.3	1.3	0.3	setosa
##	43	4.4	3.2	1.3	0.2	setosa
##	44	5.0	3.5	1.6	0.6	setosa
##	45	5.1	3.8	1.9	0.4	setosa
##	46	4.8	3.0	1.4	0.3	setosa
##	47	5.1	3.8	1.6	0.2	setosa
##	48	4.6	3.2	1.4	0.2	setosa
##	49	5.3	3.7	1.5	0.2	setosa
##	50	5.0	3.3	1.4	0.2	setosa
##	51	7.0	3.2	4.7	1.4 vers	
##	52	6.4	3.2	4.5	1.5 vers	
##	53	6.9	3.1	4.9	1.5 vers	
##	54	5.5	2.3	4.0	1.3 vers	
##	55	6.5	2.8	4.6	1.5 vers	
##		5.7	2.8	4.5	1.3 vers	
##		6.3	3.3	4.7	1.6 vers	
##		4.9	2.4	3.3	1.0 vers	
	59	6.6	2.9	4.6	1.3 vers	
	60	5.2	2.7	3.9	1.4 vers	
	61	5.0	2.0	3.5	1.0 vers	
	62	5.9	3.0	4.2	1.5 vers	
	63	6.0	2.2	4.0	1.0 vers	
##	64	6.1	2.9	4.7	1.4 vers	
##	65	5.6	2.9	3.6	1.3 vers	
##	66	6.7	3.1	4.4	1.4 vers	
##	67	5.6	3.0	4.5	1.5 vers	
##	68	5.8	2.7	4.1	1.0 vers	
##	69	6.2	2.2	4.5	1.5 vers	
	70	5.6	2.5	3.9	1.1 vers	
	70	5.9	3.2	4.8	1.1 vers	
	72	6.1	2.8	4.0	1.3 vers	
##		6.3	2.5	4.9	1.5 vers	
##	10	0.5	۷. ن	エ・ ジ	1.0 Vers	PICOTOL

## 74	6.1	2.8	4.7	1.2 versicolor
## 75	6.4	2.9	4.3	1.3 versicolor
## 76	6.6	3.0	4.4	1.4 versicolor
## 77	6.8	2.8	4.8	1.4 versicolor
## 78	6.7	3.0	5.0	1.7 versicolor
## 79	6.0	2.9	4.5	1.5 versicolor
## 80	5.7	2.6	3.5	1.0 versicolor
## 81	5.5	2.4	3.8	1.1 versicolor
## 82	5.5	2.4	3.7	1.0 versicolor
## 83	5.8	2.7	3.9	1.2 versicolor
## 84	6.0	2.7	5.1	1.6 versicolor
## 85	5.4	3.0	4.5	1.5 versicolor
## 86	6.0	3.4	4.5	1.6 versicolor
## 87	6.7	3.1	4.7	1.5 versicolor
## 88	6.3	2.3	4.4	1.3 versicolor
## 89	5.6	3.0	4.1	1.3 versicolor
## 90	5.5	2.5	4.0	1.3 versicolor
## 91	5.5	2.6	4.4	1.2 versicolor
## 92	6.1	3.0	4.6	1.4 versicolor
## 93	5.8	2.6	4.0	1.2 versicolor
## 94	5.0	2.3	3.3	1.0 versicolor
## 95	5.6	2.7	4.2	1.3 versicolor
## 96	5.7	3.0	4.2	1.2 versicolor
## 97	5.7	2.9	4.2	1.3 versicolor
## 98	6.2	2.9	4.3	1.3 versicolor
## 99	5.1	2.5	3.0	1.1 versicolor
## 100	5.7	2.8	4.1	1.3 versicolor
## 101	6.3	3.3	6.0	2.5 virginica
## 102	5.8	2.7	5.1	1.9 virginica
## 103	7.1	3.0	5.9	2.1 virginica
## 104	6.3	2.9	5.6	1.8 virginica
## 105	6.5	3.0	5.8	2.2 virginica
## 106	7.6	3.0	6.6	2.1 virginica
## 107	4.9	2.5	4.5	1.7 virginica
## 108	7.3	2.9	6.3	1.8 virginica
## 109	6.7	2.5	5.8	1.8 virginica
## 110	7.2	3.6	6.1	2.5 virginica
## 111	6.5	3.2	5.1	2.0 virginica
## 112	6.4	2.7	5.3	1.9 virginica
## 113	6.8	3.0	5.5	2.1 virginica
## 114	5.7	2.5	5.0	2.0 virginica
## 115	5.8	2.8	5.1	2.4 virginica
## 116	6.4	3.2	5.3	2.3 virginica
## 117	6.5	3.0	5.5	1.8 virginica
## 118	7.7	3.8	6.7	2.2 virginica
## 119	7.7	2.6	6.9	2.3 virginica
## 120	6.0	2.2	5.0	1.5 virginica
## 121	6.9	3.2	5.7	2.3 virginica
## 122	5.6	2.8	4.9	2.0 virginica
## 123	7.7	2.8	6.7	2.0 virginica
## 124	6.3	2.7	4.9	1.8 virginica
## 125	6.7	3.3	5.7	2.1 virginica
## 126	7.2	3.2	6.0	1.8 virginica
## 127	6.2	2.8	4.8	1.8 virginica
				_

```
## 128
                6.1
                            3.0
                                         4.9
                                                      1.8 virginica
## 129
                6.4
                            2.8
                                         5.6
                                                      2.1 virginica
## 130
                7.2
                            3.0
                                         5.8
                                                      1.6 virginica
## 131
                7.4
                            2.8
                                         6.1
                                                      1.9 virginica
## 132
                7.9
                            3.8
                                         6.4
                                                      2.0 virginica
## 133
                6.4
                            2.8
                                         5.6
                                                      2.2 virginica
## 134
                6.3
                            2.8
                                         5.1
                                                      1.5 virginica
## 135
                            2.6
                                                      1.4 virginica
                6.1
                                         5.6
## 136
                7.7
                            3.0
                                         6.1
                                                      2.3 virginica
## 137
                6.3
                            3.4
                                         5.6
                                                      2.4 virginica
## 138
                6.4
                            3.1
                                         5.5
                                                      1.8 virginica
## 139
                6.0
                            3.0
                                         4.8
                                                      1.8 virginica
## 140
                6.9
                            3.1
                                         5.4
                                                      2.1 virginica
## 141
                6.7
                            3.1
                                         5.6
                                                      2.4 virginica
## 142
                6.9
                            3.1
                                         5.1
                                                      2.3 virginica
## 143
                5.8
                            2.7
                                         5.1
                                                      1.9 virginica
## 144
                6.8
                            3.2
                                         5.9
                                                      2.3 virginica
## 145
                6.7
                            3.3
                                         5.7
                                                      2.5 virginica
## 146
                6.7
                            3.0
                                         5.2
                                                      2.3 virginica
## 147
                            2.5
                                                      1.9 virginica
                6.3
                                         5.0
## 148
                6.5
                            3.0
                                         5.2
                                                      2.0 virginica
## 149
                6.2
                            3.4
                                         5.4
                                                      2.3 virginica
## 150
                5.9
                            3.0
                                                      1.8 virginica
                                         5.1
```

a_data <- subset(data_a, Species == 'setosa')
a_data</pre>

##		Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
##	1	5.1	3.5	1.4	0.2	setosa
##	2	4.9	3.0	1.4	0.2	setosa
##	3	4.7	3.2	1.3	0.2	setosa
##	4	4.6	3.1	1.5	0.2	setosa
##	5	5.0	3.6	1.4	0.2	setosa
##	6	5.4	3.9	1.7	0.4	setosa
##	7	4.6	3.4	1.4	0.3	setosa
##	8	5.0	3.4	1.5	0.2	setosa
##	9	4.4	2.9	1.4	0.2	setosa
##	10	4.9	3.1	1.5	0.1	setosa
##	11	5.4	3.7	1.5	0.2	setosa
##	12	4.8	3.4	1.6	0.2	setosa
##	13	4.8	3.0	1.4	0.1	setosa
##	14	4.3	3.0	1.1	0.1	setosa
##	15	5.8	4.0	1.2	0.2	setosa
##	16	5.7	4.4	1.5	0.4	setosa
##	17	5.4	3.9	1.3	0.4	setosa
##	18	5.1	3.5	1.4	0.3	setosa
##	19	5.7	3.8	1.7	0.3	setosa
##	20	5.1	3.8	1.5	0.3	setosa
##	21	5.4	3.4	1.7	0.2	setosa
##	22	5.1	3.7	1.5	0.4	setosa
##	23	4.6	3.6	1.0	0.2	setosa
##	24	5.1	3.3	1.7	0.5	setosa
##	25	4.8	3.4	1.9	0.2	setosa
##	26	5.0	3.0	1.6	0.2	setosa

##	27	5.0	3.4	1.6	0.4	setosa
##	28	5.2	3.5	1.5	0.2	setosa
##	29	5.2	3.4	1.4	0.2	setosa
##	30	4.7	3.2	1.6	0.2	setosa
##	31	4.8	3.1	1.6	0.2	setosa
##	32	5.4	3.4	1.5	0.4	setosa
##	33	5.2	4.1	1.5	0.1	setosa
##	34	5.5	4.2	1.4	0.2	setosa
##	35	4.9	3.1	1.5	0.2	setosa
##	36	5.0	3.2	1.2	0.2	setosa
##	37	5.5	3.5	1.3	0.2	setosa
##	38	4.9	3.6	1.4	0.1	setosa
##	39	4.4	3.0	1.3	0.2	setosa
##	40	5.1	3.4	1.5	0.2	setosa
##	41	5.0	3.5	1.3	0.3	setosa
##	42	4.5	2.3	1.3	0.3	setosa
##	43	4.4	3.2	1.3	0.2	setosa
##	44	5.0	3.5	1.6	0.6	setosa
##	45	5.1	3.8	1.9	0.4	setosa
##	46	4.8	3.0	1.4	0.3	setosa
##	47	5.1	3.8	1.6	0.2	setosa
##	48	4.6	3.2	1.4	0.2	setosa
##	49	5.3	3.7	1.5	0.2	setosa
##	50	5.0	3.3	1.4	0.2	setosa

data_b <- data.frame(iris)
data_b</pre>

##		Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
##	1	5.1	3.5	1.4	0.2	setosa
##	2	4.9	3.0	1.4	0.2	setosa
##	3	4.7	3.2	1.3	0.2	setosa
##	4	4.6	3.1	1.5	0.2	setosa
##	5	5.0	3.6	1.4	0.2	setosa
##	6	5.4	3.9	1.7	0.4	setosa
##	7	4.6	3.4	1.4	0.3	setosa
##	8	5.0	3.4	1.5	0.2	setosa
##	9	4.4	2.9	1.4	0.2	setosa
##	10	4.9	3.1	1.5	0.1	setosa
##	11	5.4	3.7	1.5	0.2	setosa
##	12	4.8	3.4	1.6	0.2	setosa
##	13	4.8	3.0	1.4	0.1	setosa
##	14	4.3	3.0	1.1	0.1	setosa
##	15	5.8	4.0	1.2	0.2	setosa
##	16	5.7	4.4	1.5	0.4	setosa
##	17	5.4	3.9	1.3	0.4	setosa
##	18	5.1	3.5	1.4	0.3	setosa
##	19	5.7	3.8	1.7	0.3	setosa
##	20	5.1	3.8	1.5	0.3	setosa
##	21	5.4	3.4	1.7	0.2	setosa
##	22	5.1	3.7	1.5	0.4	setosa
##	23	4.6	3.6	1.0	0.2	setosa
##	24	5.1	3.3	1.7	0.5	setosa
##	25	4.8	3.4	1.9	0.2	setosa

##	26	5.0	3.0	1.6	0.2	setosa
##	27	5.0	3.4	1.6	0.4	setosa
##	28	5.2	3.5	1.5	0.2	setosa
##	29	5.2	3.4	1.4	0.2	setosa
##	30	4.7	3.2	1.6	0.2	setosa
##	31	4.8	3.1	1.6	0.2	setosa
##	32	5.4	3.4	1.5	0.4	setosa
##	33	5.2	4.1	1.5	0.1	setosa
	34	5.5	4.2	1.4	0.2	setosa
	35	4.9	3.1	1.5	0.2	setosa
	36	5.0	3.2	1.2	0.2	setosa
	37	5.5	3.5	1.3	0.2	setosa
	38	4.9	3.6	1.4	0.1	setosa
	39	4.4	3.0	1.3	0.2	setosa
	40	5.1	3.4	1.5	0.2	setosa
	41	5.0	3.5	1.3	0.2	setosa
			2.3			
	42	4.5		1.3	0.3	setosa
	43	4.4	3.2	1.3	0.2	setosa
	44	5.0	3.5	1.6	0.6	setosa
	45	5.1	3.8	1.9	0.4	setosa
	46	4.8	3.0	1.4	0.3	setosa
	47	5.1	3.8	1.6	0.2	setosa
	48	4.6	3.2	1.4	0.2	setosa
	49	5.3	3.7	1.5	0.2	setosa
	50	5.0	3.3	1.4	0.2	setosa
	51	7.0	3.2	4.7		ersicolor
	52	6.4	3.2	4.5		ersicolor
	53	6.9	3.1	4.9		ersicolor
	54	5.5	2.3	4.0		ersicolor
	55	6.5	2.8	4.6		ersicolor
	56	5.7	2.8	4.5		ersicolor
##	57	6.3	3.3	4.7		ersicolor
##	58	4.9	2.4	3.3	1.0 ve	ersicolor
##	59	6.6	2.9	4.6	1.3 ve	ersicolor
##	60	5.2	2.7	3.9	1.4 ve	ersicolor
##	61	5.0	2.0	3.5	1.0 ve	ersicolor
##	62	5.9	3.0	4.2	1.5 ve	ersicolor
##	63	6.0	2.2	4.0	1.0 ve	ersicolor
##	64	6.1	2.9	4.7	1.4 ve	ersicolor
##	65	5.6	2.9	3.6	1.3 ve	ersicolor
##	66	6.7	3.1	4.4	1.4 ve	ersicolor
##	67	5.6	3.0	4.5	1.5 ve	ersicolor
##	68	5.8	2.7	4.1	1.0 ve	ersicolor
##	69	6.2	2.2	4.5	1.5 ve	ersicolor
##	70	5.6	2.5	3.9	1.1 ve	ersicolor
##	71	5.9	3.2	4.8	1.8 ve	ersicolor
##	72	6.1	2.8	4.0	1.3 ve	ersicolor
##	73	6.3	2.5	4.9	1.5 ve	ersicolor
	74	6.1	2.8	4.7		ersicolor
	75	6.4	2.9	4.3		ersicolor
	76	6.6	3.0	4.4		ersicolor
	77	6.8	2.8	4.8		ersicolor
	78	6.7	3.0	5.0		ersicolor
##		6.0	2.9	4.5		ersicolor
	•	-	-	-	- '	

## 80	5.7	2.6	3.5	1.0 versicolor
## 81	5.5	2.4	3.8	1.1 versicolor
## 82	5.5	2.4	3.7	1.0 versicolor
## 83	5.8	2.7	3.9	1.2 versicolor
## 84	6.0	2.7	5.1	1.6 versicolor
## 85	5.4	3.0	4.5	1.5 versicolor
## 86	6.0	3.4	4.5	1.6 versicolor
## 87	6.7	3.1	4.7	1.5 versicolor
## 88	6.3	2.3	4.4	1.3 versicolor
## 89	5.6	3.0	4.1	1.3 versicolor
## 90	5.5	2.5	4.0	1.3 versicolor
## 91	5.5	2.6	4.4	1.2 versicolor
## 92	6.1	3.0	4.6	1.4 versicolor
## 92 ## 93	5.8	2.6	4.0	1.4 versicolor
## 94	5.0	2.3	3.3	1.0 versicolor
## 95	5.6	2.7	4.2	1.3 versicolor
## 96	5.7	3.0	4.2	1.2 versicolor
## 97	5.7	2.9	4.2	1.3 versicolor
## 98	6.2	2.9	4.3	1.3 versicolor
## 99	5.1	2.5	3.0	1.1 versicolor
## 100	5.7	2.8	4.1	1.3 versicolor
## 101	6.3	3.3	6.0	2.5 virginica
## 102	5.8	2.7	5.1	1.9 virginica
## 103	7.1	3.0	5.9	2.1 virginica
## 104	6.3	2.9	5.6	1.8 virginica
## 105	6.5	3.0	5.8	2.2 virginica
## 106	7.6	3.0	6.6	2.1 virginica
## 107	4.9	2.5	4.5	1.7 virginica
## 108	7.3	2.9	6.3	1.8 virginica
## 109	6.7	2.5	5.8	1.8 virginica
## 110	7.2	3.6	6.1	2.5 virginica
## 111	6.5	3.2	5.1	2.0 virginica
## 112	6.4	2.7	5.3	1.9 virginica
## 113	6.8	3.0	5.5	2.1 virginica
## 114	5.7	2.5	5.0	2.0 virginica
## 115	5.8	2.8	5.1	2.4 virginica
## 116	6.4	3.2	5.3	2.3 virginica
## 117	6.5	3.0	5.5	•
		3.8		1.8 virginica
## 118	7.7		6.7	2.2 virginica
## 119	7.7	2.6	6.9	2.3 virginica
## 120	6.0	2.2	5.0	1.5 virginica
## 121	6.9	3.2	5.7	2.3 virginica
## 122	5.6	2.8	4.9	2.0 virginica
## 123	7.7	2.8	6.7	2.0 virginica
## 124	6.3	2.7	4.9	1.8 virginica
## 125	6.7	3.3	5.7	2.1 virginica
## 126	7.2	3.2	6.0	1.8 virginica
## 127	6.2	2.8	4.8	1.8 virginica
## 128	6.1	3.0	4.9	1.8 virginica
## 129	6.4	2.8	5.6	2.1 virginica
## 130	7.2	3.0	5.8	1.6 virginica
## 131	7.4	2.8	6.1	1.9 virginica
## 132	7.9	3.8	6.4	2.0 virginica
## 133	6.4	2.8	5.6	2.2 virginica
				=

```
1.5 virginica
## 134
               6.3
                           2.8
                                        5.1
## 135
               6.1
                           2.6
                                        5.6
                                                    1.4 virginica
## 136
               7.7
                           3.0
                                        6.1
                                                    2.3 virginica
## 137
               6.3
                           3.4
                                        5.6
                                                    2.4 virginica
## 138
               6.4
                           3.1
                                        5.5
                                                    1.8 virginica
## 139
                                                    1.8 virginica
               6.0
                           3.0
                                        4.8
## 140
               6.9
                           3.1
                                        5.4
                                                    2.1 virginica
                                                    2.4 virginica
## 141
               6.7
                           3.1
                                        5.6
## 142
               6.9
                                        5.1
                                                    2.3 virginica
                           3.1
## 143
               5.8
                           2.7
                                        5.1
                                                    1.9 virginica
## 144
                                        5.9
               6.8
                           3.2
                                                    2.3 virginica
## 145
               6.7
                           3.3
                                        5.7
                                                    2.5 virginica
## 146
               6.7
                           3.0
                                        5.2
                                                    2.3 virginica
## 147
               6.3
                           2.5
                                        5.0
                                                    1.9 virginica
## 148
               6.5
                           3.0
                                        5.2
                                                    2.0 virginica
## 149
               6.2
                                        5.4
                                                    2.3 virginica
                           3.4
## 150
               5.9
                           3.0
                                        5.1
                                                    1.8 virginica
```

b_data <- subset(data_b, Species == 'versicolor')
b_data</pre>

##				Petal.Length	Petal.Width	Species
##	51	7.0	3.2	4.7	1.4	versicolor
##	52	6.4	3.2	4.5	1.5	${\tt versicolor}$
##	53	6.9	3.1	4.9	1.5	versicolor
##	54	5.5	2.3	4.0	1.3	${\tt versicolor}$
##	55	6.5	2.8	4.6	1.5	${\tt versicolor}$
##	56	5.7	2.8	4.5	1.3	${\tt versicolor}$
##	57	6.3	3.3	4.7	1.6	${\tt versicolor}$
##	58	4.9	2.4	3.3	1.0	versicolor
##	59	6.6	2.9	4.6	1.3	versicolor
##	60	5.2	2.7	3.9	1.4	${\tt versicolor}$
##	61	5.0	2.0	3.5	1.0	${\tt versicolor}$
##	62	5.9	3.0	4.2	1.5	versicolor
##	63	6.0	2.2	4.0	1.0	versicolor
##	64	6.1	2.9	4.7	1.4	versicolor
##	65	5.6	2.9	3.6		${\tt versicolor}$
##	66	6.7	3.1	4.4	1.4	versicolor
##	67	5.6	3.0	4.5	1.5	${\tt versicolor}$
##	68	5.8	2.7	4.1	1.0	${\tt versicolor}$
##	69	6.2	2.2	4.5	1.5	${\tt versicolor}$
##	70	5.6	2.5	3.9		versicolor
##	71	5.9	3.2	4.8		versicolor
##	72	6.1	2.8	4.0	1.3	${\tt versicolor}$
##	73	6.3	2.5	4.9		versicolor
##	74	6.1	2.8	4.7	1.2	versicolor
##	75	6.4	2.9	4.3		versicolor
##	76	6.6	3.0	4.4	1.4	${\tt versicolor}$
##	77	6.8	2.8	4.8	1.4	versicolor
##	78	6.7	3.0	5.0		versicolor
##	79	6.0	2.9	4.5		${\tt versicolor}$
##	80	5.7	2.6	3.5		${\tt versicolor}$
##	81	5.5	2.4	3.8	1.1	${\tt versicolor}$
##	82	5.5	2.4	3.7	1.0	versicolor

##	83	5.8	2.7	3.9	1.2 versicolor
##	84	6.0	2.7	5.1	1.6 versicolor
##	85	5.4	3.0	4.5	1.5 versicolor
##	86	6.0	3.4	4.5	1.6 versicolor
##	87	6.7	3.1	4.7	1.5 versicolor
##	88	6.3	2.3	4.4	1.3 versicolor
##	89	5.6	3.0	4.1	1.3 versicolor
##	90	5.5	2.5	4.0	1.3 versicolor
##	91	5.5	2.6	4.4	1.2 versicolor
##	92	6.1	3.0	4.6	1.4 versicolor
##	93	5.8	2.6	4.0	1.2 versicolor
##	94	5.0	2.3	3.3	1.0 versicolor
##	95	5.6	2.7	4.2	1.3 versicolor
##	96	5.7	3.0	4.2	1.2 versicolor
##	97	5.7	2.9	4.2	1.3 versicolor
##	98	6.2	2.9	4.3	1.3 versicolor
##	99	5.1	2.5	3.0	1.1 versicolor
##	100	5.7	2.8	4.1	1.3 versicolor

data_c <- data.frame(iris)
data_c</pre>

##		Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
##	1	5.1	3.5	1.4	0.2	setosa
##	2	4.9	3.0	1.4	0.2	setosa
##	3	4.7	3.2	1.3	0.2	setosa
##	4	4.6	3.1	1.5	0.2	setosa
##	5	5.0	3.6	1.4	0.2	setosa
##	6	5.4	3.9	1.7	0.4	setosa
##	7	4.6	3.4	1.4	0.3	setosa
##	8	5.0	3.4	1.5	0.2	setosa
##	9	4.4	2.9	1.4	0.2	setosa
##	10	4.9	3.1	1.5	0.1	setosa
##	11	5.4	3.7	1.5	0.2	setosa
##	12	4.8	3.4	1.6	0.2	setosa
##	13	4.8	3.0	1.4	0.1	setosa
##	14	4.3	3.0	1.1	0.1	setosa
##	15	5.8	4.0	1.2	0.2	setosa
##	16	5.7	4.4	1.5	0.4	setosa
##	17	5.4	3.9	1.3	0.4	setosa
##	18	5.1	3.5	1.4	0.3	setosa
##	19	5.7	3.8	1.7	0.3	setosa
##	20	5.1	3.8	1.5	0.3	setosa
##	21	5.4	3.4	1.7	0.2	setosa
##	22	5.1	3.7	1.5	0.4	setosa
##	23	4.6	3.6	1.0	0.2	setosa
##		5.1	3.3	1.7	0.5	setosa
##	25	4.8	3.4	1.9	0.2	setosa
##	26	5.0	3.0	1.6	0.2	setosa
##	27	5.0	3.4	1.6	0.4	setosa
##	28	5.2	3.5	1.5	0.2	setosa
##	29	5.2	3.4	1.4	0.2	setosa
	30	4.7	3.2	1.6	0.2	setosa
##	31	4.8	3.1	1.6	0.2	setosa

## 32	5.4	3.4	1.5	0.4 setosa	3
## 33	5.2	4.1	1.5	0.1 setosa	3
## 34	5.5	4.2	1.4	0.2 setosa	a
## 35	4.9	3.1	1.5	0.2 setosa	a
## 36	5.0	3.2	1.2	0.2 setosa	a
## 37	5.5	3.5	1.3	0.2 setosa	a
## 38	4.9	3.6	1.4	0.1 setosa	a
## 39	4.4	3.0	1.3	0.2 setosa	
## 40	5.1	3.4	1.5	0.2 setosa	
## 41	5.0	3.5	1.3	0.3 setosa	
## 42	4.5	2.3	1.3	0.3 setosa	
## 43		3.2	1.3	0.2 setos	
	4.4				
## 44	5.0	3.5	1.6	0.6 setosa	
## 45	5.1	3.8	1.9	0.4 setosa	
## 46	4.8	3.0	1.4	0.3 setosa	
## 47	5.1	3.8	1.6	0.2 setosa	
## 48	4.6	3.2	1.4	0.2 setosa	3
## 49	5.3	3.7	1.5	0.2 setosa	3
## 50	5.0	3.3	1.4	0.2 setosa	3
## 51	7.0	3.2	4.7	1.4 versicolor	r
## 52	6.4	3.2	4.5	1.5 versicolo	r
## 53	6.9	3.1	4.9	1.5 versicolo	r
## 54	5.5	2.3	4.0	1.3 versicolo	r
## 55	6.5	2.8	4.6	1.5 versicolo	r
## 56	5.7	2.8	4.5	1.3 versicolo	r
## 57	6.3	3.3	4.7	1.6 versicolo	
## 58	4.9	2.4	3.3	1.0 versicolor	
## 59	6.6	2.9	4.6	1.3 versicolor	
## 60	5.2	2.7	3.9	1.4 versicolo	
## 61	5.0	2.0	3.5	1.0 versicolo	
## 62			4.2		
	5.9	3.0		1.5 versicolo	
## 63	6.0	2.2	4.0	1.0 versicolo	
## 64	6.1	2.9	4.7	1.4 versicolo	
## 65	5.6	2.9	3.6	1.3 versicolo	
## 66	6.7	3.1	4.4	1.4 versicolo	
## 67	5.6	3.0	4.5	1.5 versicolor	
## 68	5.8	2.7	4.1	1.0 versicolor	
## 69	6.2	2.2	4.5	1.5 versicolo	r
## 70	5.6	2.5	3.9	1.1 versicolo	r
## 71	5.9	3.2	4.8	1.8 versicolo	r
## 72	6.1	2.8	4.0	1.3 versicolo	r
## 73	6.3	2.5	4.9	1.5 versicolo	r
## 74	6.1	2.8	4.7	1.2 versicolo	r
## 75	6.4	2.9	4.3	1.3 versicolo	r
## 76	6.6	3.0	4.4	1.4 versicolo	r
## 77	6.8	2.8	4.8	1.4 versicolo	
## 78	6.7	3.0	5.0	1.7 versicolo	
## 79	6.0	2.9	4.5	1.5 versicolo	
## 80	5.7	2.6	3.5	1.0 versicolo	
## 81				1.1 versicolo	
	5.5	2.4	3.8		
## 82 ## 92	5.5	2.4	3.7	1.0 versicolor	
## 83	5.8	2.7	3.9	1.2 versicolo	
## 84	6.0	2.7	5.1	1.6 versicolo	
## 85	5.4	3.0	4.5	1.5 versicolo	٢

## 86	6.0	3.4	4.5	1.6 versicolor
## 87	6.7	3.1	4.7	1.5 versicolor
## 88	6.3	2.3	4.4	1.3 versicolor
## 89	5.6	3.0	4.1	1.3 versicolor
## 90	5.5	2.5	4.0	1.3 versicolor
## 91	5.5	2.6	4.4	1.2 versicolor
## 92	6.1	3.0	4.6	1.4 versicolor
## 93	5.8	2.6	4.0	1.2 versicolor
## 94	5.0	2.3	3.3	1.0 versicolor
## 95	5.6	2.7	4.2	1.3 versicolor
## 96	5.7	3.0	4.2	1.2 versicolor
## 97	5.7	2.9	4.2	1.3 versicolor
## 98	6.2	2.9	4.3	1.3 versicolor
## 99	5.1	2.5	3.0	1.1 versicolor
## 100	5.7	2.8	4.1	1.3 versicolor
## 101	6.3	3.3	6.0	2.5 virginica
## 102	5.8	2.7	5.1	1.9 virginica
## 103	7.1	3.0	5.9	2.1 virginica
## 104	6.3	2.9	5.6	1.8 virginica
## 105	6.5	3.0	5.8	2.2 virginica
## 106	7.6	3.0	6.6	2.1 virginica
## 107	4.9	2.5	4.5	1.7 virginica
## 108	7.3	2.9	6.3	1.8 virginica
## 109	6.7	2.5	5.8	1.8 virginica
## 110	7.2	3.6	6.1	2.5 virginica
## 111	6.5	3.2	5.1	2.0 virginica
## 112	6.4	2.7	5.3	1.9 virginica
## 113	6.8	3.0	5.5	2.1 virginica
## 114	5.7	2.5	5.0	2.0 virginica
## 115	5.8	2.8	5.1	2.4 virginica
## 116	6.4	3.2	5.3	2.3 virginica
## 117	6.5	3.0	5.5	1.8 virginica
## 118	7.7	3.8	6.7	2.2 virginica
## 119	7.7	2.6	6.9	2.3 virginica
## 120	6.0	2.2	5.0	1.5 virginica
## 121	6.9	3.2	5.7	2.3 virginica
## 122	5.6	2.8	4.9	2.0 virginica
## 123	7.7	2.8	6.7	2.0 virginica
## 124	6.3	2.7	4.9	1.8 virginica
## 125	6.7	3.3	5.7	2.1 virginica
## 126	7.2	3.2	6.0	1.8 virginica
## 127	6.2	2.8	4.8	1.8 virginica
## 128	6.1	3.0	4.9	1.8 virginica
## 129	6.4	2.8	5.6	2.1 virginica
## 130	7.2	3.0	5.8	1.6 virginica
## 131	7.4	2.8	6.1	1.9 virginica
## 132	7.9	3.8	6.4	2.0 virginica
## 133	6.4	2.8	5.6	2.2 virginica
## 134	6.3	2.8	5.1	1.5 virginica
## 135	6.1	2.6	5.6	1.4 virginica
## 136	7.7	3.0	6.1	2.3 virginica
## 137	6.3	3.4	5.6	2.4 virginica
## 138	6.4	3.1	5.5	1.8 virginica
## 139	6.0	3.0	4.8	1.8 virginica
100	•••	J. 0	1.0	1.0 /116111100

```
2.1 virginica
## 140
               6.9
                           3.1
                                        5.4
## 141
               6.7
                           3.1
                                        5.6
                                                    2.4 virginica
## 142
               6.9
                           3.1
                                        5.1
                                                    2.3 virginica
## 143
               5.8
                           2.7
                                        5.1
                                                    1.9 virginica
## 144
                           3.2
                                                    2.3 virginica
               6.8
                                        5.9
                                                    2.5 virginica
## 145
               6.7
                           3.3
                                        5.7
## 146
                                                    2.3 virginica
               6.7
                           3.0
                                        5.2
## 147
               6.3
                           2.5
                                        5.0
                                                    1.9 virginica
## 148
                                                    2.0 virginica
               6.5
                           3.0
                                        5.2
## 149
               6.2
                           3.4
                                        5.4
                                                    2.3 virginica
## 150
               5.9
                           3.0
                                        5.1
                                                    1.8 virginica
```

c_data <-subset(data_c, Species == 'virginica')
c_data</pre>

##		Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
##	101	6.3	3.3	6.0	2.5	virginica
##	102	5.8	2.7	5.1	1.9	virginica
##	103	7.1	3.0	5.9	2.1	virginica
##	104	6.3	2.9	5.6	1.8	virginica
##	105	6.5	3.0	5.8	2.2	virginica
##	106	7.6	3.0	6.6	2.1	virginica
##	107	4.9	2.5	4.5	1.7	virginica
##	108	7.3	2.9	6.3	1.8	virginica
##	109	6.7	2.5	5.8	1.8	virginica
##	110	7.2	3.6	6.1	2.5	virginica
##	111	6.5	3.2	5.1	2.0	virginica
##	112	6.4	2.7	5.3	1.9	virginica
##	113	6.8	3.0	5.5	2.1	virginica
##	114	5.7	2.5	5.0	2.0	virginica
##	115	5.8	2.8	5.1	2.4	virginica
##	116	6.4	3.2	5.3	2.3	virginica
##	117	6.5	3.0	5.5	1.8	virginica
##	118	7.7	3.8	6.7	2.2	virginica
##	119	7.7	2.6	6.9	2.3	virginica
##	120	6.0	2.2	5.0	1.5	virginica
##	121	6.9	3.2	5.7	2.3	virginica
##	122	5.6	2.8	4.9	2.0	virginica
##	123	7.7	2.8	6.7	2.0	virginica
##	124	6.3	2.7	4.9	1.8	virginica
##	125	6.7	3.3	5.7	2.1	virginica
##	126	7.2	3.2	6.0	1.8	virginica
##	127	6.2	2.8	4.8	1.8	virginica
##	128	6.1	3.0	4.9		virginica
##	129	6.4	2.8	5.6	2.1	virginica
##	130	7.2	3.0	5.8	1.6	virginica
##	131	7.4	2.8	6.1	1.9	virginica
##	132	7.9	3.8	6.4	2.0	virginica
	133	6.4	2.8	5.6	2.2	virginica
##	134	6.3	2.8	5.1	1.5	virginica
##	135	6.1	2.6	5.6		virginica
##	136	7.7	3.0	6.1	2.3	virginica
##	137	6.3	3.4	5.6	2.4	virginica
##	138	6.4	3.1	5.5	1.8	virginica

```
## 139
            6.0
                        3.0
                                 4.8
                                           1.8 virginica
## 140
             6.9
                        3.1
                                   5.4
                                              2.1 virginica
## 141
             6.7
                        3.1
                                   5.6
                                             2.4 virginica
## 142
             6.9
                        3.1
                                   5.1
                                              2.3 virginica
## 143
             5.8
                        2.7
                                   5.1
                                              1.9 virginica
## 144
             6.8
                        3.2
                                   5.9
                                              2.3 virginica
## 145
             6.7
                        3.3
                                   5.7
                                              2.5 virginica
## 146
                                              2.3 virginica
             6.7
                        3.0
                                   5.2
                                   5.0
                                              1.9 virginica
## 147
             6.3
                        2.5
## 148
             6.5
                       3.0
                                   5.2
                                              2.0 virginica
                                              2.3 virginica
## 149
             6.2
                        3.4
                                   5.4
## 150
             5.9
                        3.0
                                   5.1
                                              1.8 virginica
setosa <- colMeans(a_data[sapply(a_data,is.numeric)])</pre>
setosa
## Sepal.Length Sepal.Width Petal.Length Petal.Width
##
        5.006
                    3.428
                                1.462
                                           0.246
versicolor <- colMeans(b_data[sapply(b_data,is.numeric)])</pre>
versicolor
## Sepal.Length Sepal.Width Petal.Length Petal.Width
                   2.770 4.260
##
       5.936
                                           1.326
virginica <- colMeans(c_data[sapply(c_data,is.numeric)])</pre>
virginica
## Sepal.Length Sepal.Width Petal.Length Petal.Width
                               5.552
##
        6.588
                   2.974
                                           2.026
sec <- rbind(setosa, versicolor, virginica)</pre>
            Sepal.Length Sepal.Width Petal.Length Petal.Width
##
## setosa
                 5.006 3.428
                                   1.462
## versicolor
                  5.936
                                        4.260
                             2.770
                                                    1.326
## virginica
                  6.588
                             2.974
                                         5.552
                                                    2.026
barplot(sec, beside =TRUE, main = "Iris Mean",
       xlab = "Characterisics", ylab = "Mean Scores",
       col = c("red", "green", "blue"))
```

Iris Mean Sepal.Length Sepal.Width Characterisics