

Example of ANOVA Analysis with R

Biostatistics

Mice Diet Restriction Study

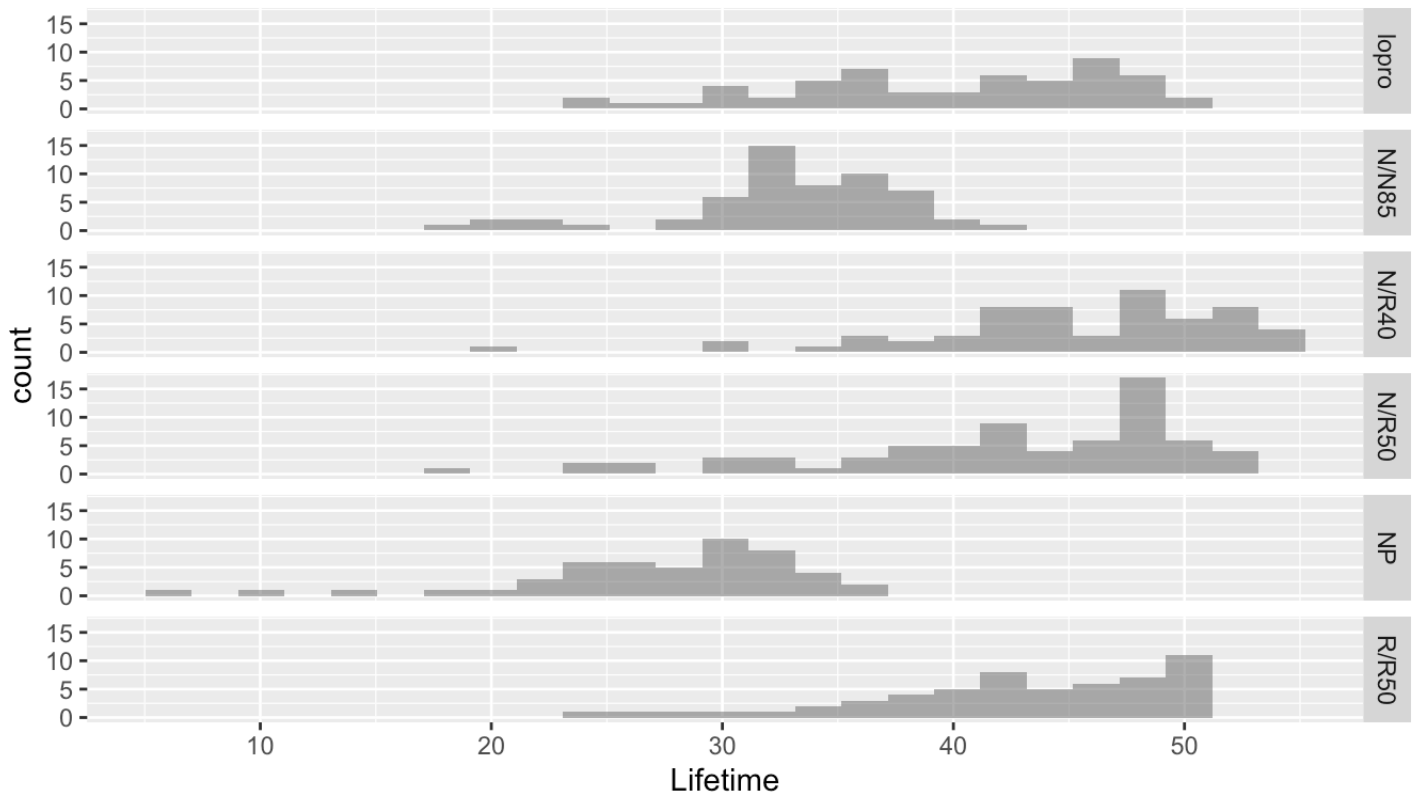
Get Summary Statistics

```
favstats(Lifetime~Diet,data=mice)
```

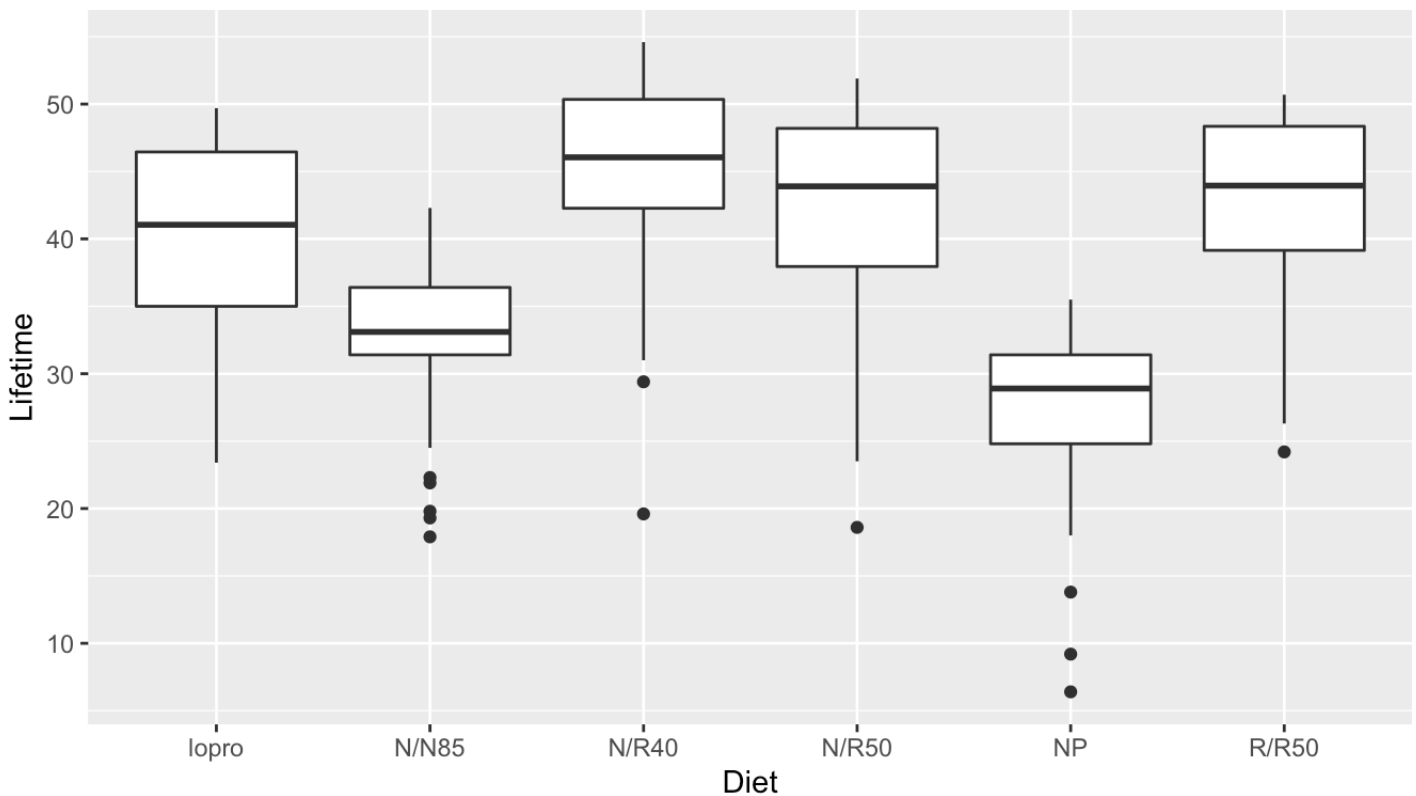
##	Diet	min	Q1	median	Q3	max	mean	sd	n	missing
## 1	lopro	23.4	35.000	41.05	46.45	49.7	39.68571	6.991695	56	0
## 2	N/N85	17.9	31.400	33.10	36.40	42.3	32.69123	5.125297	57	0
## 3	N/R40	19.6	42.275	46.05	50.35	54.6	45.11667	6.703406	60	0
## 4	N/R50	18.6	37.950	43.90	48.20	51.9	42.29718	7.768195	71	0
## 5	NP	6.4	24.800	28.90	31.40	35.5	27.40204	6.133701	49	0
## 6	R/R50	24.2	39.150	43.95	48.35	50.7	42.88571	6.683152	56	0

Data plots

```
#Data plots  
gf_histogram(~Lifetime|Diet~.,data=mice)
```



```
gf_boxplot(Lifetime~Diet,data=mice)
```



Plots and summary suggest differences in lifetime across diets.

ANOVA procedures and output

```
mice.mod1=lm(Lifetime~Diet,data=mice)
anova(mice.mod1)
```

```
## Analysis of Variance Table
##
## Response: Lifetime
##           Df Sum Sq Mean Sq F value    Pr(>F)
## Diet         5  12734   2546.8   57.104 < 2.2e-16 ***
## Residuals  343   15297     44.6
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Multiple Comparisons Procedures (not on Midterm III)

Tukey Multiple Comparisons

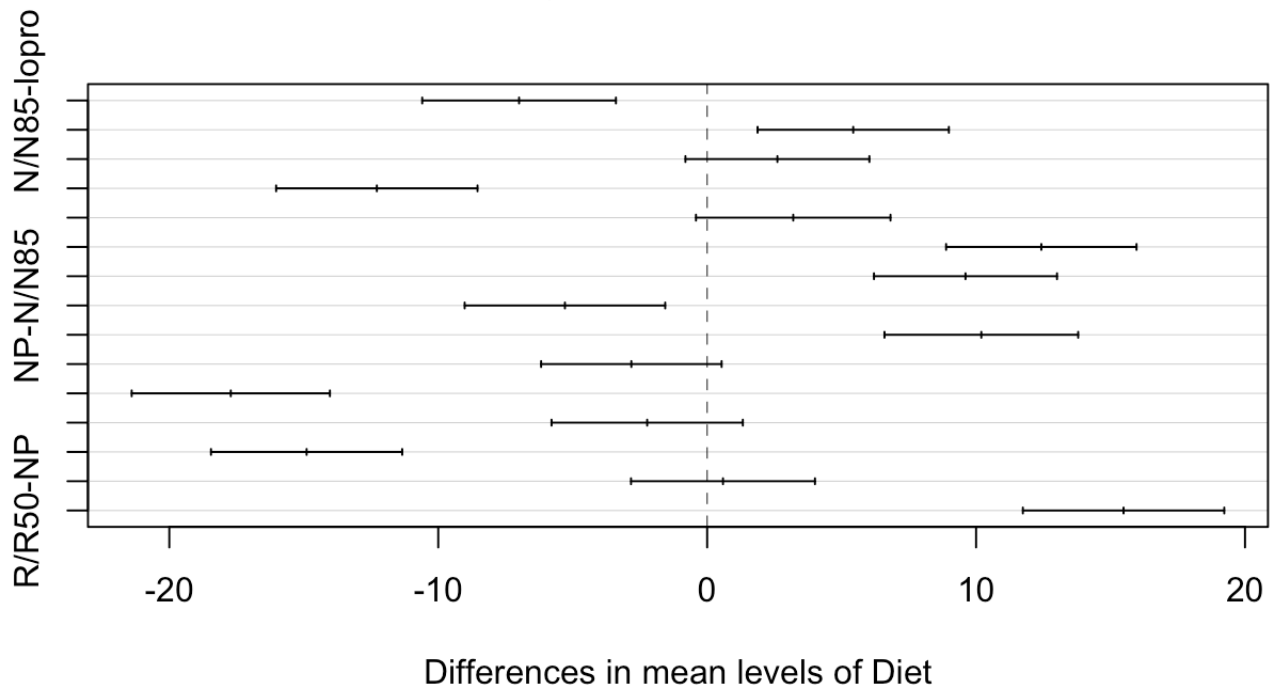
```
TukeyHSD(mice.mod1)
```

```
## Tukey multiple comparisons of means
## 95% family-wise confidence level
##
## Fit: aov(formula = x)
##
## $Diet
```

	diff	lwr	upr	p adj
N/N85-lopro	-6.9944862	-10.5955556	-3.3934168	0.0000008
N/R40-lopro	5.4309524	1.8747778	8.9871269	0.0002306
N/R50-lopro	2.6114688	-0.8091319	6.0320696	0.2460200
NP-lopro	-12.2836735	-16.0275913	-8.5397556	0.0000000
R/R50-lopro	3.2000000	-0.4169683	6.8169683	0.1167873
N/R40-N/N85	12.4254386	8.8854359	15.9654413	0.0000000
N/R50-N/N85	9.6059550	6.2021702	13.0097399	0.0000000
NP-N/N85	-5.2891873	-9.0177476	-1.5606269	0.0008380
R/R50-N/N85	10.1944862	6.5934168	13.7955556	0.0000000
N/R50-N/R40	-2.8194836	-6.1757356	0.5367684	0.1564608
NP-N/R40	-17.7146259	-21.3998448	-14.0294069	0.0000000
R/R50-N/R40	-2.2309524	-5.7871269	1.3252222	0.4684413
NP-N/R50	-14.8951423	-18.4497127	-11.3405719	0.0000000
R/R50-N/R50	0.5885312	-2.8320696	4.0091319	0.9963976
R/R50-NP	15.4836735	11.7397556	19.2275913	0.0000000

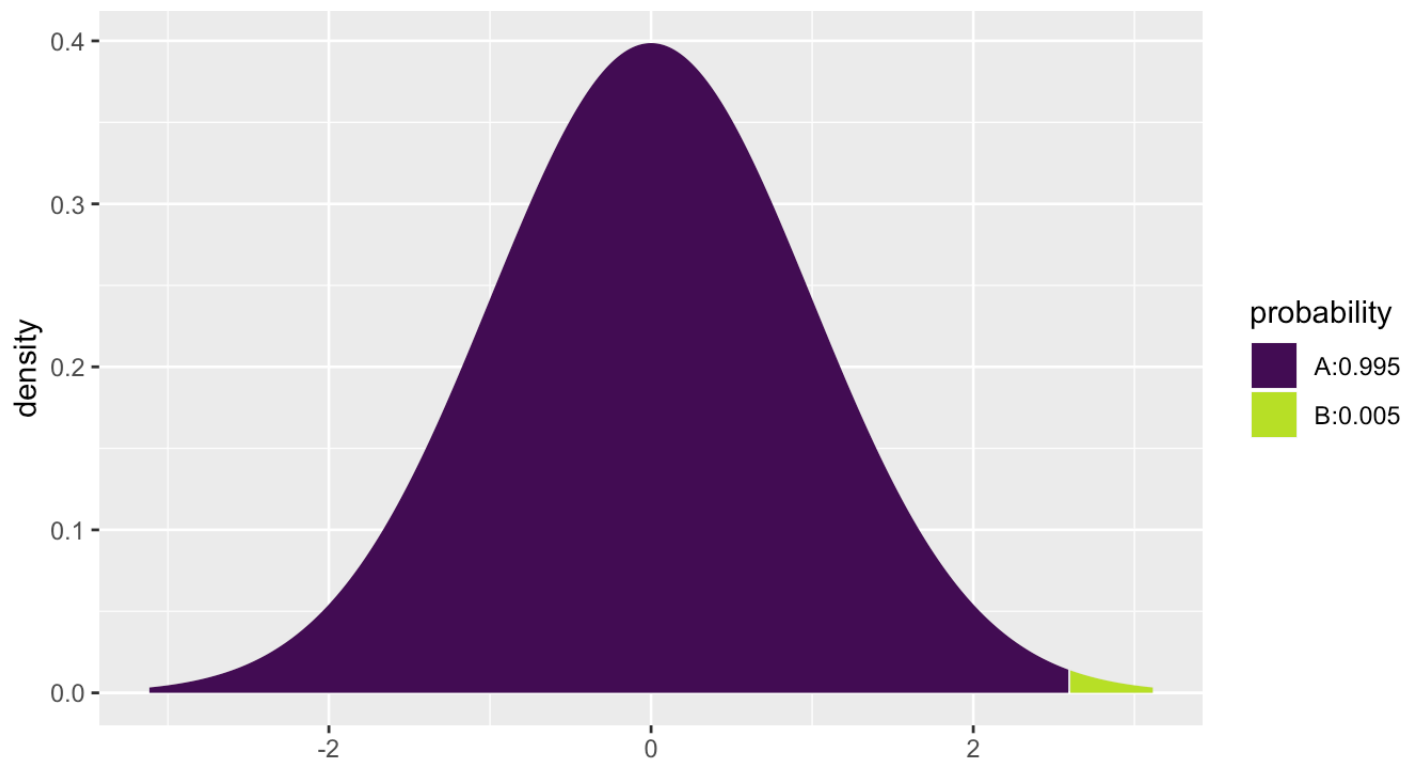
```
plot(TukeyHSD(mice.mod1))
```

95% family-wise confidence level



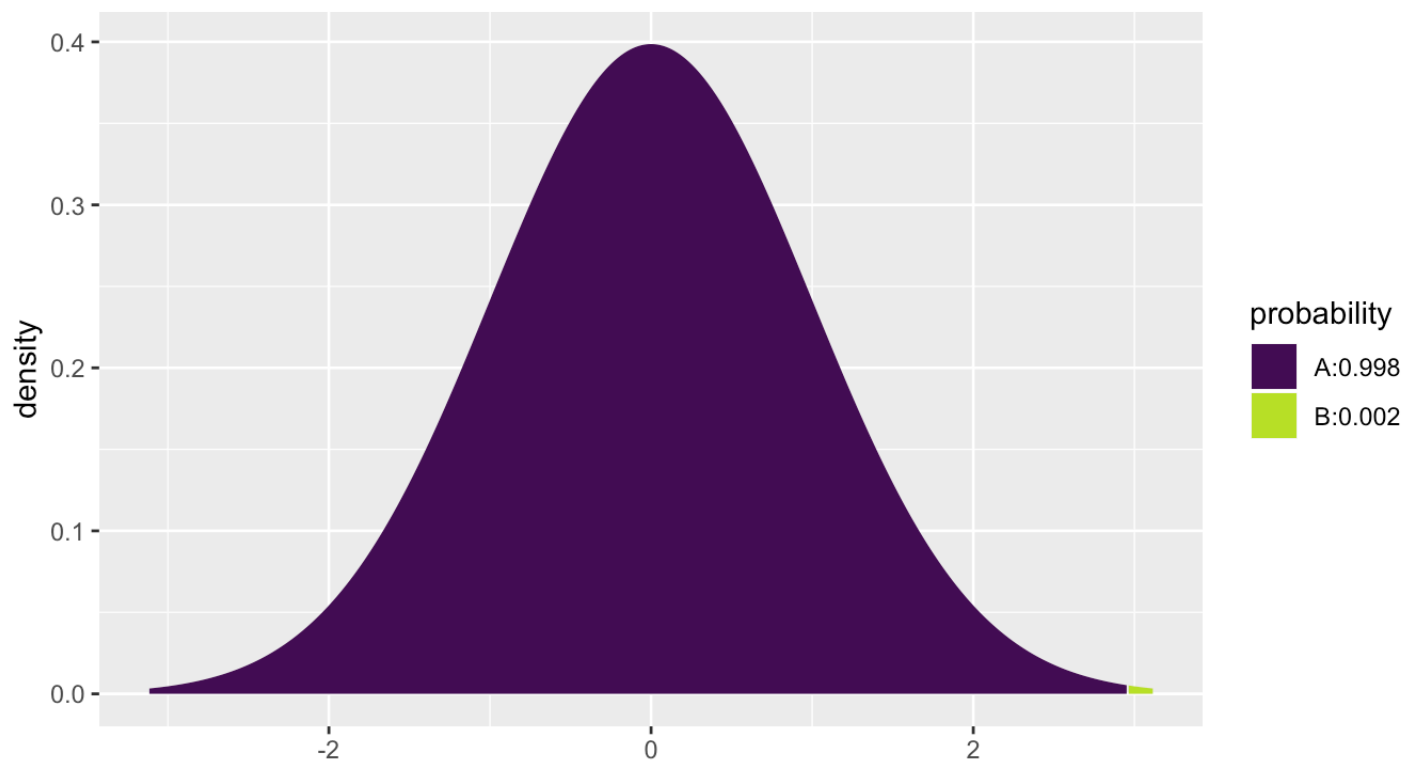
Bonferroni Critical Value

```
# Multiplier for c=5 planned comparisons  
xqt(1-.05/(2*5),df=343)
```



```
## [1] 2.590239
```

```
# Multiplier for all possible c=15 planned comparisons  
xqt(1-.05/(2*15),df=343)
```



```
## [1] 2.955904
```