

11.4: Simulating one-factor ANOVAs

The following builds simulated data for a one-factor ANOVA, appropriate for a between subjects design. We build the data frame containing a column for the group factor levels, and a column for the DV. Then, we run the ANOVA and print it out.

```
library(xtable)
N <- 10
groups <- rep(c("A","B","C"), each=10)
DV <- c(rnorm(100,10,15), # means for group A
        rnorm(100,10,15), # means for group B
        rnorm(100,20,15)  # means for group C
        )
sim_df<-data.frame(groups,DV)
aov_results <- summary(aov(DV~groups, sim_df))
knitr::kable(xtable(aov_results))
```

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	Df	Sum Sq	Mean Sq	F value	Pr(>F)
groups	2	1187.127	593.5635	2.683555	F)" style="vertical-align:middle;">0.0699765
Residuals	297	65692.093	221.1855	NA	F)" style="vertical-align:middle;">NA

In this next example, we simulate the same design 100 times, save the (p) -values, and then determine the proportion of significant simulations.

```
N <- 10
save_p<-length(100)
for(i in 1:100){
  groups <- rep(c("A","B","C"), each=10)
  DV <- c(rnorm(100,10,15), # means for group A
          rnorm(100,10,15), # means for group B
          rnorm(100,20,15)  # means for group C
          )
  sim_df<-data.frame(groups,DV)

  aov_results <- summary(aov(DV~groups, sim_df))
  save_p[i]<-aov_results[[1]]$`Pr(>F)`[1]
}
length(save_p[save_p<0.05])/100
```

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0.07

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