

# oneway\_\_power2.R

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```
# oneway_power2.R
# Power analysis for one-way ANOVA
# Load necessary libraries
library(ggplot2)

# H1 means, sample sizes, standard deviation, alpha
groupmeans <- c(20,22,22,25,18)
nvals <- 2:20
stddev <- 3
alpha <- 0.05

# Power analysis
powout1 <- power.anova.test(groups = length(groupmeans),n=nvals,
between.var=var(groupmeans),within.var=stddev^2,sig.level=alpha)
powout1

##
##      Balanced one-way analysis of variance power calculation
##
##      groups = 5
##      n = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
##      between.var = 6.8
##      within.var = 9
##      sig.level = 0.05
##      power = 0.2224267, 0.4560036, 0.6570687, 0.8004897, 0.8911668, 0.9436998, 0.9721479, 0.986
##
## NOTE: n is number in each group

# New standard deviation and alpha
stddev <- 3
alpha <- 0.01

# Power analysis
powout2 <- power.anova.test(groups = length(groupmeans),n=nvals,
between.var=var(groupmeans),within.var=stddev^2,sig.level=alpha)
powout2

##
##      Balanced one-way analysis of variance power calculation
##
##      groups = 5
##      n = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
##      between.var = 6.8
##      within.var = 9
##      sig.level = 0.01
##      power = 0.05891323, 0.18477786, 0.35879551, 0.53764975, 0.69070045, 0.80594499, 0.88477641
##
## NOTE: n is number in each group
```

```
# New standard deviation and alpha
```

```
stddev <- 6
```

```
alpha <- 0.05
```

```
# Power analysis
```

```
powout3 <- power.anova.test(groups = length(groupmeans),n=nvals,
```

```
between.var=var(groupmeans),within.var=stddev^2,sig.level=alpha)
```

```
powout3
```

```
##
```

```
##      Balanced one-way analysis of variance power calculation
```

```
##
```

```
##      groups = 5
```

```
##      n = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
```

```
##      between.var = 6.8
```

```
##      within.var = 36
```

```
##      sig.level = 0.05
```

```
##      power = 0.08816366, 0.13636087, 0.18925076, 0.24525119, 0.30291439, 0.36094260, 0.41822276
```

```
##
```

```
## NOTE: n is number in each group
```

```
# New standard deviation and alpha
```

```
stddev <- 6
```

```
alpha <- 0.01
```

```
# Power analysis
```

```
powout4 <- power.anova.test(groups = length(groupmeans),n=nvals,
```

```
between.var=var(groupmeans),within.var=stddev^2,sig.level=alpha)
```

```
powout4
```

```
##
```

```
##      Balanced one-way analysis of variance power calculation
```

```
##
```

```
##      groups = 5
```

```
##      n = 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
```

```
##      between.var = 6.8
```

```
##      within.var = 36
```

```
##      sig.level = 0.01
```

```
##      power = 0.01932480, 0.03558285, 0.05736414, 0.08429352, 0.11593616, 0.15173416, 0.19103218
```

```
##
```

```
## NOTE: n is number in each group
```

```
# Make data frame from power output
```

```
n <- powout1$n
```

```
power1 <- powout1$power
```

```
power2 <- powout2$power
```

```
power3 <- powout3$power
```

```
power4 <- powout4$power
```

```
powdata <- as.data.frame(cbind(n,power1,power2,power3,power4))
```

```
# Print data
```

```
powdata
```

```
##      n      power1      power2      power3      power4
```

```
## 1    2 0.2224267 0.05891323 0.08816366 0.01932480
```

```
## 2 3 0.4560036 0.18477786 0.13636087 0.03558285
## 3 4 0.6570687 0.35879551 0.18925076 0.05736414
## 4 5 0.8004897 0.53764975 0.24525119 0.08429352
## 5 6 0.8911668 0.69070045 0.30291439 0.11593616
## 6 7 0.9436998 0.80594499 0.36094260 0.15173416
## 7 8 0.9721479 0.88477641 0.41822276 0.19103218
## 8 9 0.9867385 0.93477074 0.47383994 0.23311529
## 9 10 0.9938920 0.96458019 0.52707552 0.27724576
## 10 11 0.9972677 0.98146050 0.57739525 0.32269499
## 11 12 0.9988090 0.99060772 0.62443121 0.36876938
## 12 13 0.9994928 0.99537892 0.66796045 0.41482988
## 13 14 0.9997885 0.99778556 0.70788249 0.46030566
## 14 15 0.9999134 0.99896393 0.74419703 0.50470230
## 15 16 0.9999652 0.99952573 0.77698308 0.54760554
## 16 17 0.9999862 0.99978720 0.80637990 0.58868118
## 17 18 0.9999946 0.99990627 0.83257035 0.62767212
## 18 19 0.9999979 0.99995941 0.85576655 0.66439315
## 19 20 0.9999992 0.99998270 0.87619797 0.69872438
```

```
# Plot power vs. sample size
ggplot(powdata,aes(n,power1))+
  geom_line(color="black",size=1)+
  geom_point(size=4,shape=1)+
  geom_line(aes(n,power2),color="black",size=1,linetype="dashed")+
  geom_point(aes(n,power2),color="black",size=4,shape=1)+
  geom_line(aes(n,power3),color="black",size=1)+
  geom_point(aes(n,power3),color="black",size=4,shape=3)+
  geom_line(aes(n,power4),color="black",size=1,linetype="dashed")+
  geom_point(aes(n,power4),color="black",size=4,shape=3)+
  ggtitle("Power for one-way ANOVA")
```

Power for one-way ANOVA

