

ICA 2

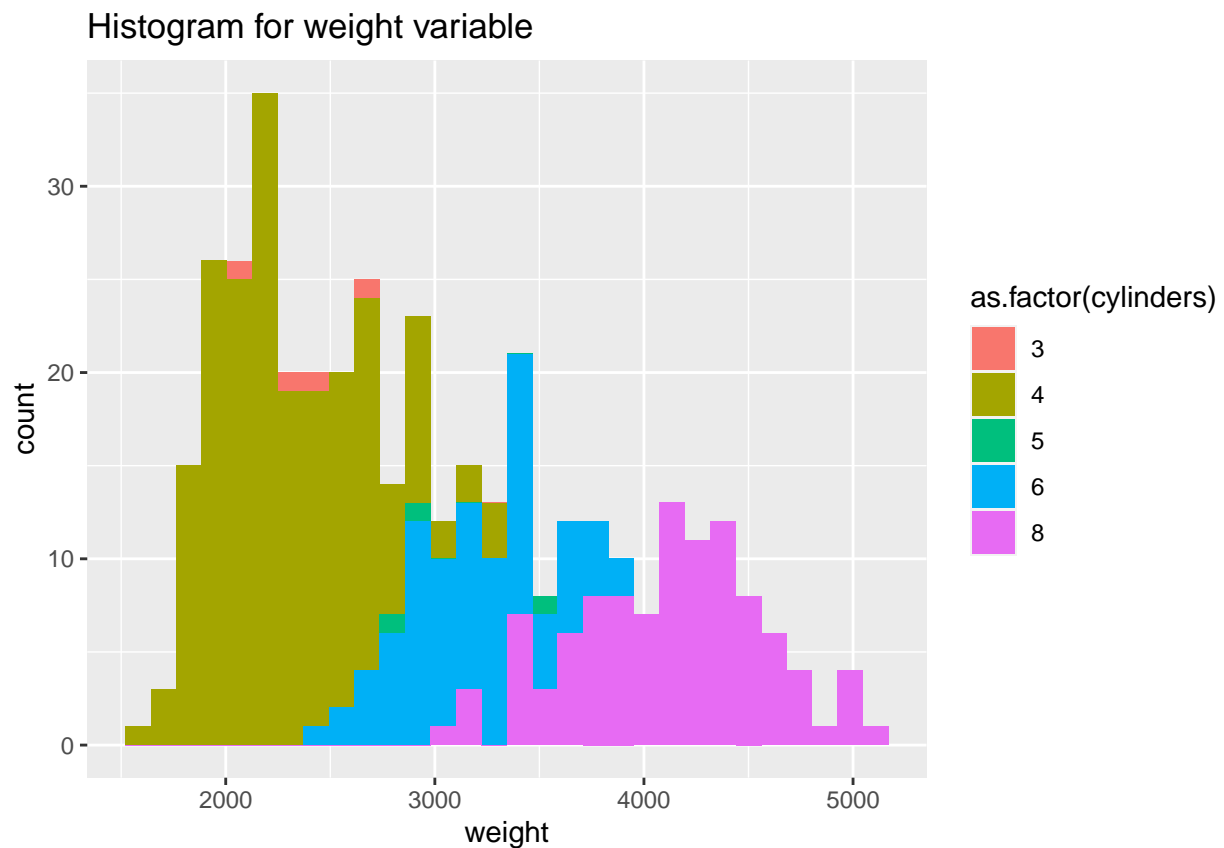
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```
head(cars_multi)
```

```
#1. Create a histogram for the weight variable, with the bars filled by the cylinder value.  
Q1 <- ggplot(data = cars_multi, aes(x = weight, fill = as.factor(cylinders))) + geom_histogram() + labs  
Q1
```

```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```



Including Plots

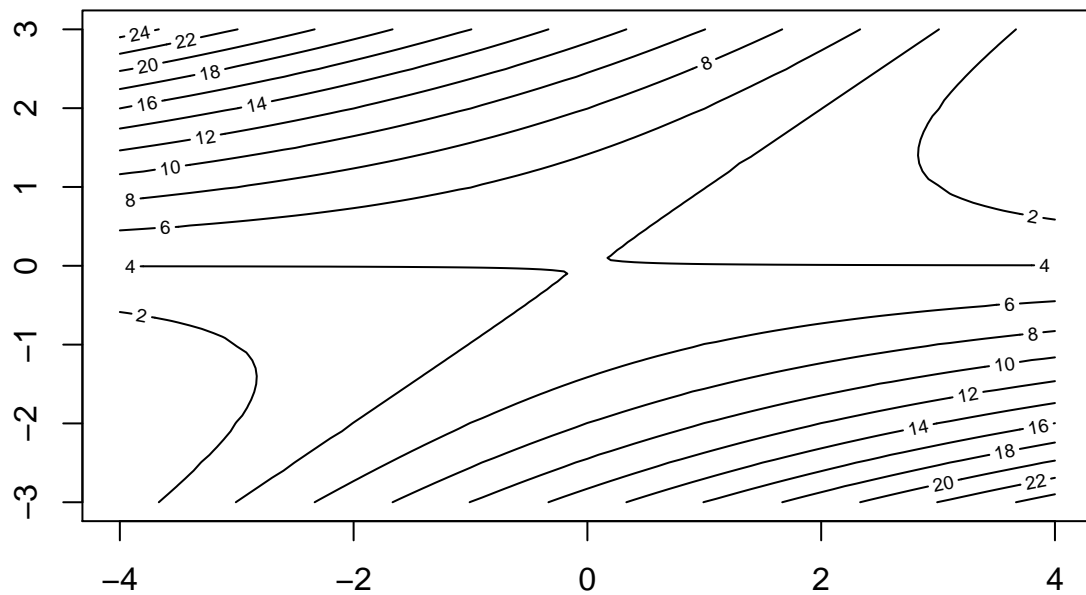
You can also embed plots, for example:

```
#2. Plot a scatter plot of mpg vs. weight (y is mpg, x is weight), colored by cylinders (you will have
Q2 <- ggplot(cars_multi, aes(x = weight, y = mpg, color = as.factor(cylinders))) + geom_point(size = 1)
Q2
```

```
## Warning in max(ids, na.rm = TRUE): no non-missing arguments to max; returning
## -Inf
```



```
#3. Take the function  $f(x, y) = 2x^2 - xy + y^2$ . Create a contour plot with both contour and ggplot + ge
fn <- function(x,y){
  z = 2*x^2 - x*y + y^2
  return(z)
}
x <- seq(-4,4, by = 0.1)
y <- seq(-3,3, by = 0.1)
z <- matrix(nrow = length(x), ncol = length(y))
for(i in 1:length(y)){
  for(j in 1:length(x)){
    z[j,i] = fn(x[j],y[i])
  }
}
contour(x,y,z)
```



```

contour_data <- data.frame(x = numeric(0), y = numeric(0), z = numeric(0))
for(i in 1:length(y)){
  for(j in 1:length(x)){
    contour_data[nrow(contour_data) + 1,] = c(x=x[j],y=y[i],z=fn(x[j],y[i]))
  }
}
ggplot(data = contour_data, aes(x = x, y = y)) + geom_contour(aes(z = z))

```

