Pstat 174-Lab 1

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- Question 1

```
set.seed(1)
X=runif(1000,-1,1)
Y=X^2
cor(X,Y)
```

```
## [1] 0.04042929
```

```
knitr::opts_chunk$set(echo = TRUE)
```

They are uncorrelated since correlation of X and Y is 0.04042929. They are not independent because there is quadratic relationship between X and Y. They are uncorrelated if X and Y are independent We can't conclude that they are independent or not if X and Y are uncorrelated.

- Question 2

```
set.seed(1)
x1 = runif(10, min = -1, max = 1)
mean(x1)
```

```
## [1] 0.1030277
```

```
x2 = runif(100, min = -1, max = 1)
mean(x2)
```

```
## [1] 0.03034921
```

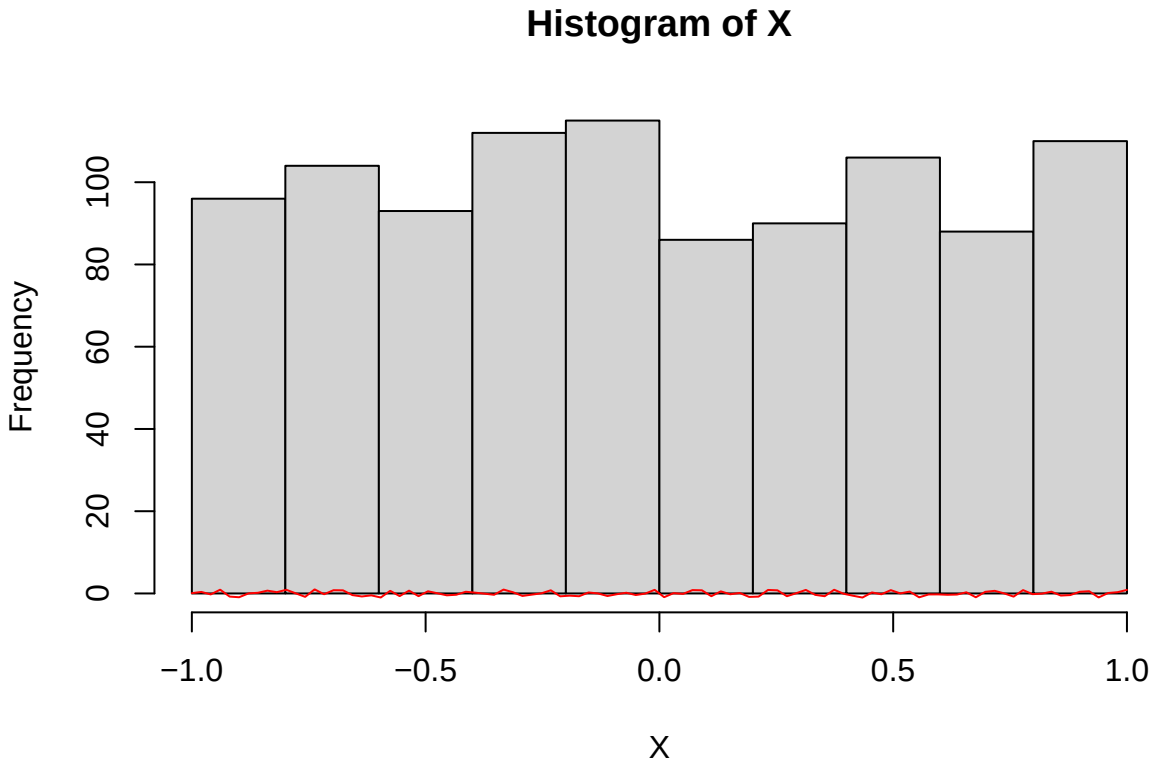
```
x3 = runif(1000, min = -1, max = 1)
mean(x3)
```

```
## [1] -0.007201965
```

We can conclude that the sample mean gets closer to the true mean as the sample size increases.

- Question 3

```r
set.seed(1)
X <- runif(1000, min = -1, max = 1)
hist(X)
curve(runif(x, min = -1, max = 1), col = 'red', n =100, add = T)
```

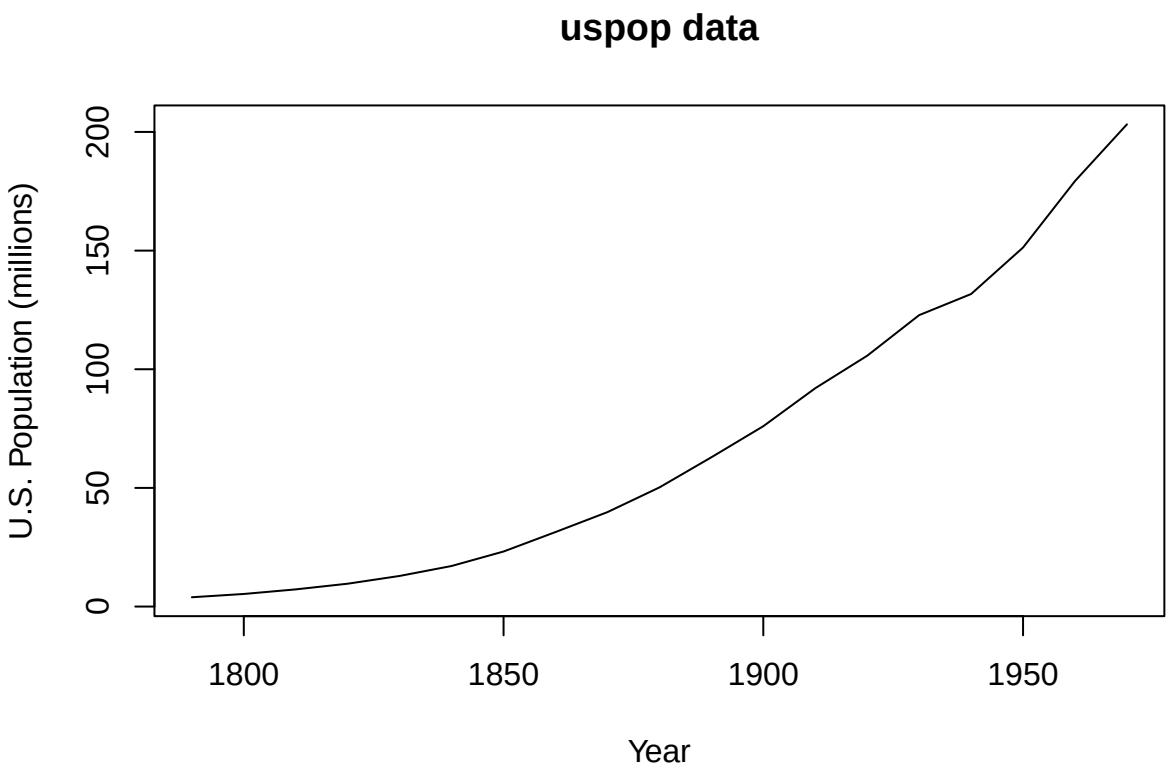


sampling distribution of the sampling means approaches a normal distribution

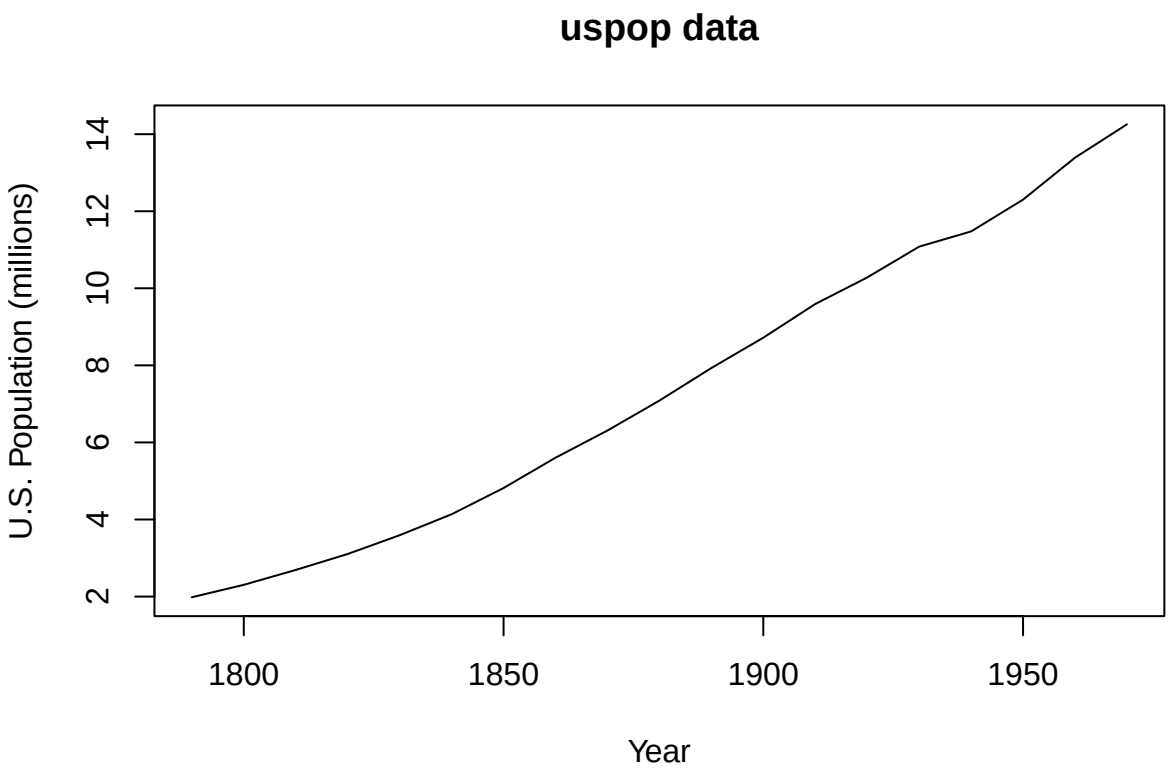
- Question 4

```r
uspop_sqrt = sqrt(uspop)

plot(uspop, main = "uspop data", xlab = "Year",
     ylab = "U.S. Population (millions)")
```




```
plot(uspop_sqrt, main = "uspop data", xlab = "Year",
     ylab = "U.S. Population (millions)")
```



The image of the second graph tends to be more linear, which means that the slope grows more smoothly.