Assignment 9

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PS1

1.

A function to sample from the antiderivative of the distribution.

```
invcdfgen <- function(x) {
  if (x <= 1 && x >= 0) {
    if (x <= .5) {
      return (sqrt(2 * x))
    } else {
      return (2 - sqrt(2 * (1 - x)))
    }
  }
}
```

2.

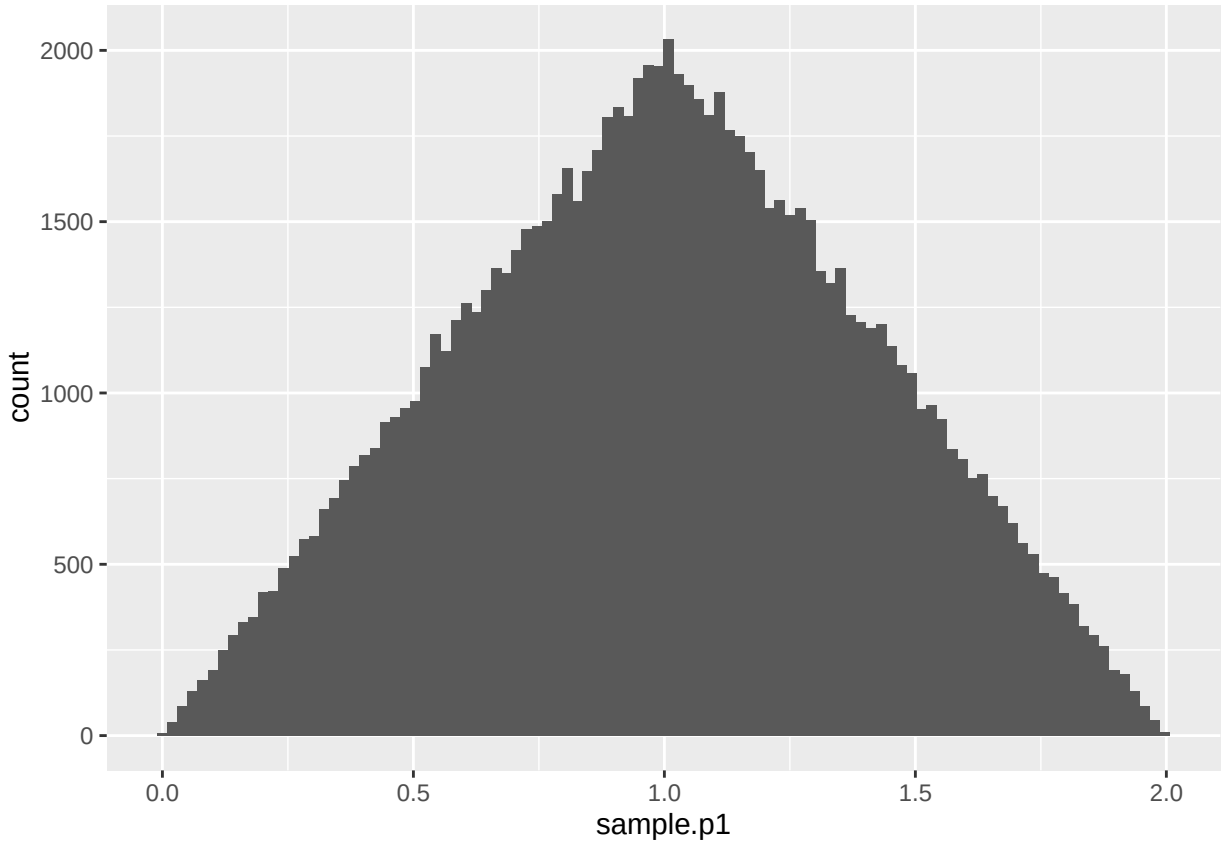
And now a function for the second section using antiderivatives again

```
invcdfgen2 <- function(x) {
  if (x <= 1 && x >= 0) {
    if (x <= .5) {
      return (1 - sqrt(1 - 2 * x))
    } else {
      return (1 + sqrt(2 * x - 1))
    }
  }
}
```

3.

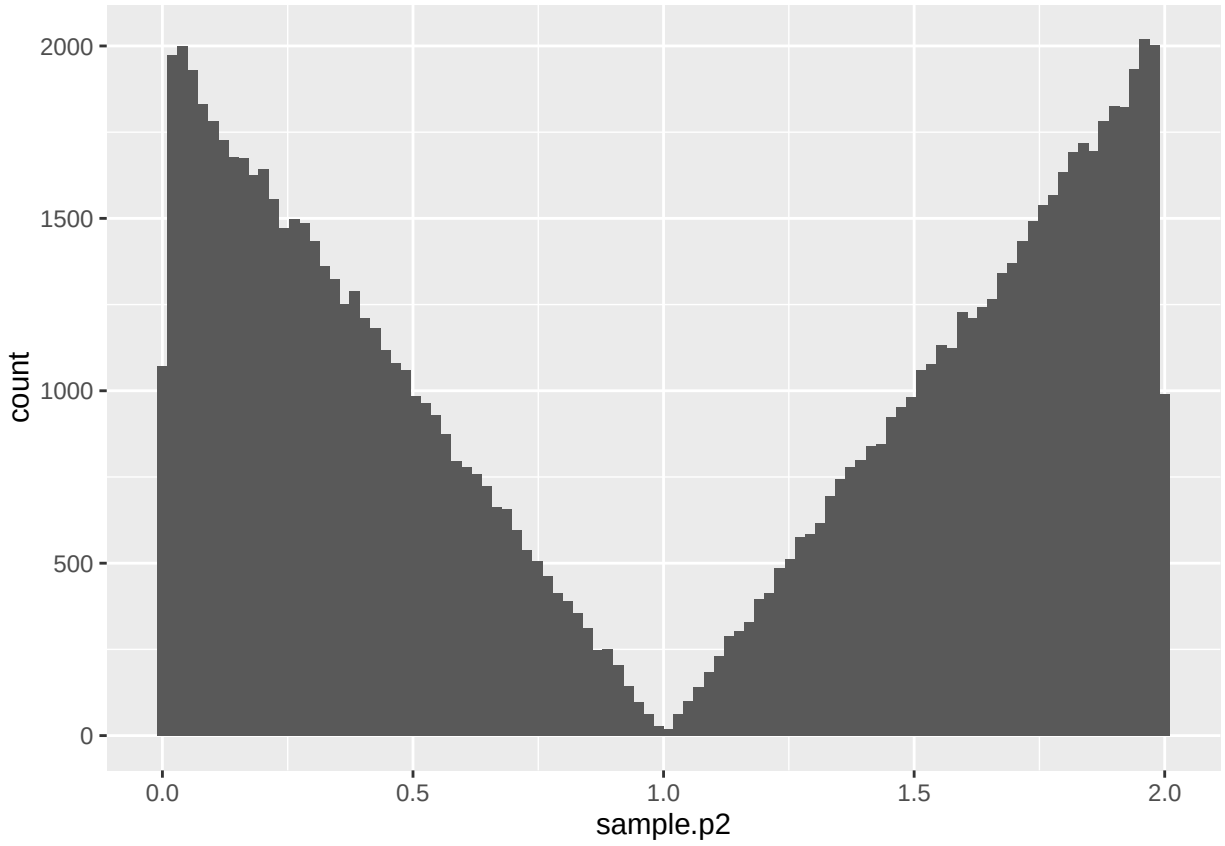
Sample from part 1:

```
library(ggplot2)
sample.p1 <- sapply(runif(100000), invcdfgen)
qplot(sample.p1, geom = "histogram", bins = 100)
```



And a sample from part 2:

```
sample.p2 <- sapply(runif(100000), invcdfgen2)
qplot(sample.p2, geom = "histogram", bins = 100)
```



4.

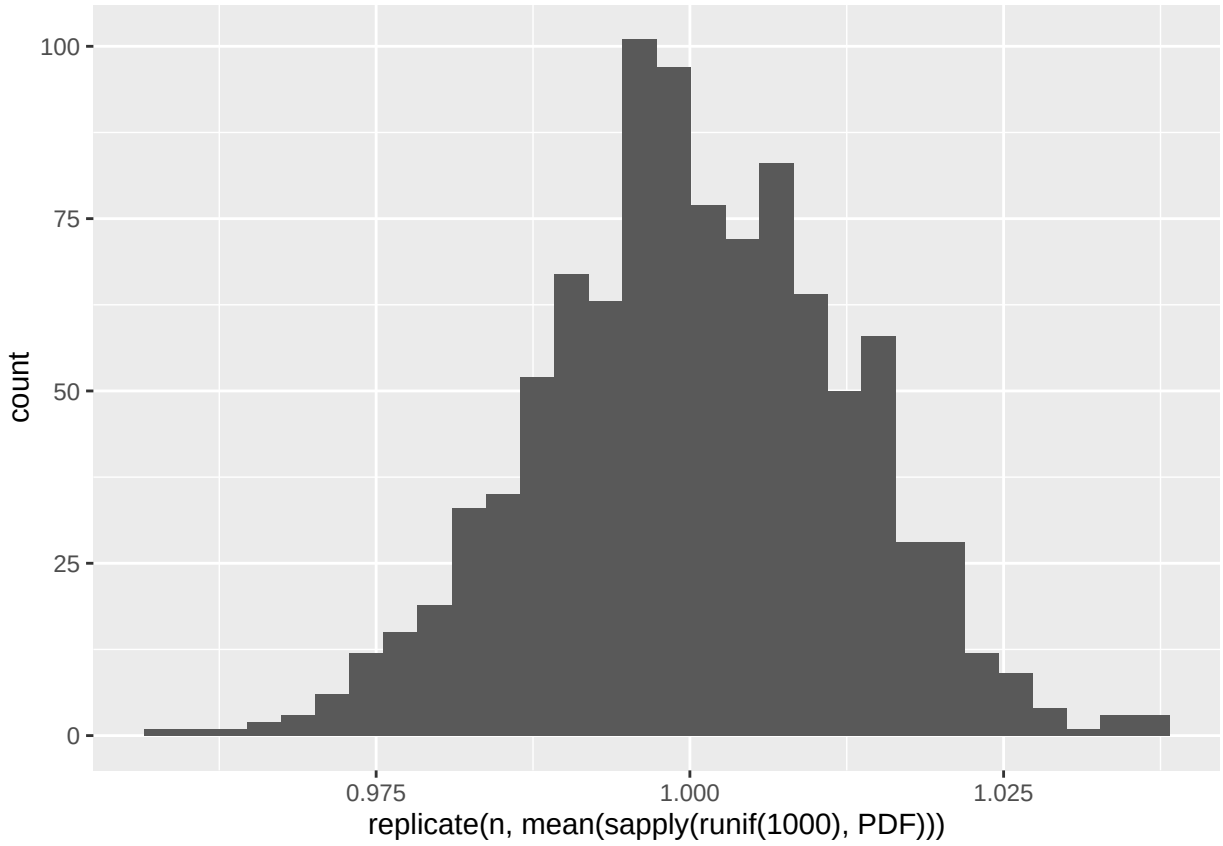
Just going to put n into a replicate function for this part:

```
centralcalc <- function(n, PDF) {
  qplot(replicate(n, mean(sapply(runif(1000), PDF))))
}
```

And now testing it out with both functions:

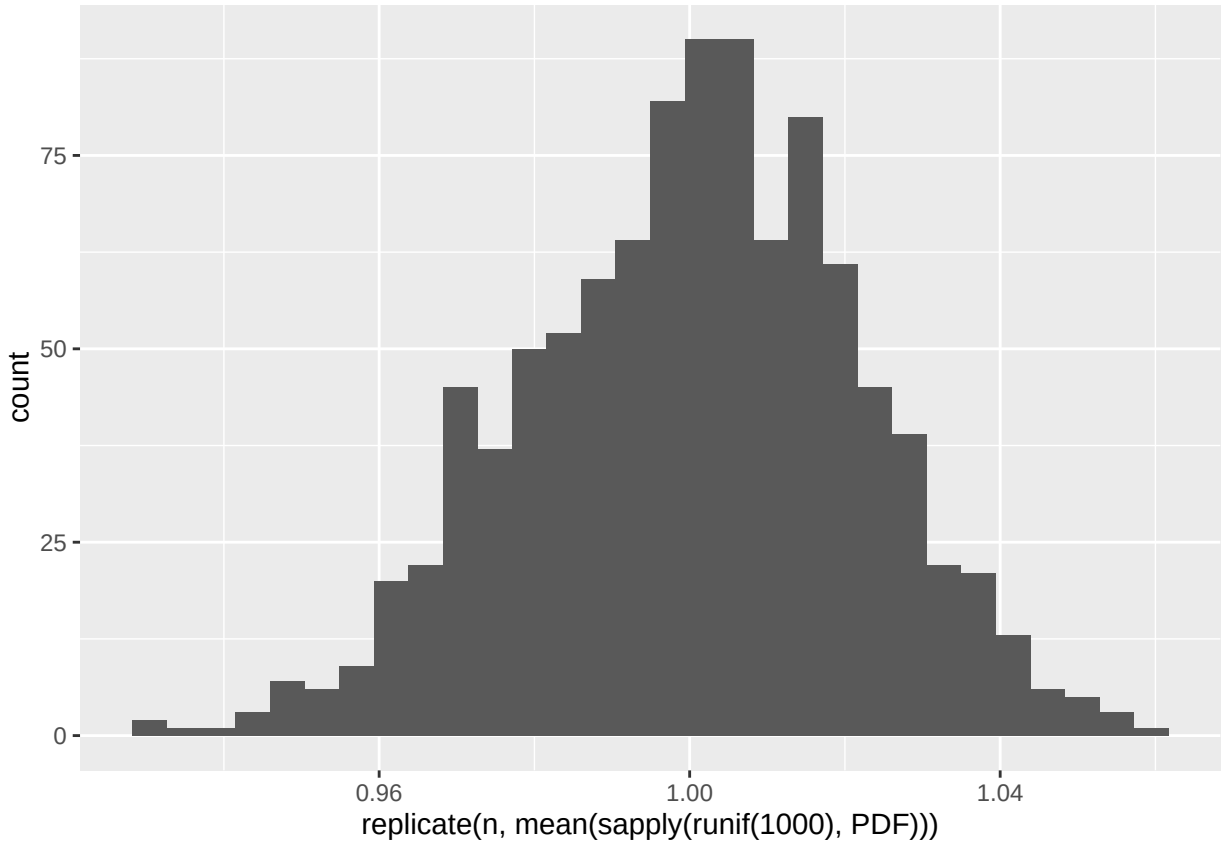
```
centralcalc(1000, invcdfgen)
```

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




```
centralcalc(1000, invcdfgen2)
```

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

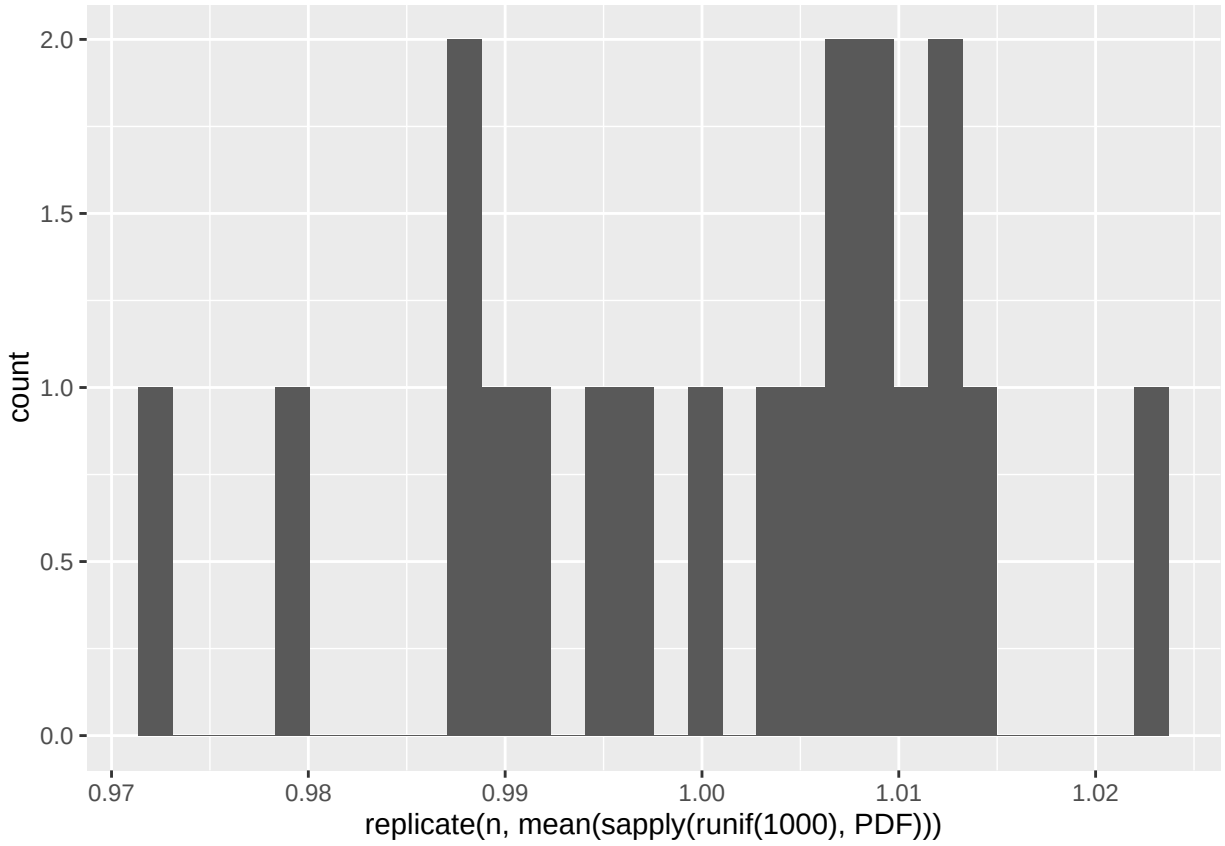


5.

And trying with n = 20 to see how the CLT works. The graphs will not look perfect as the number of samples is fairly low.

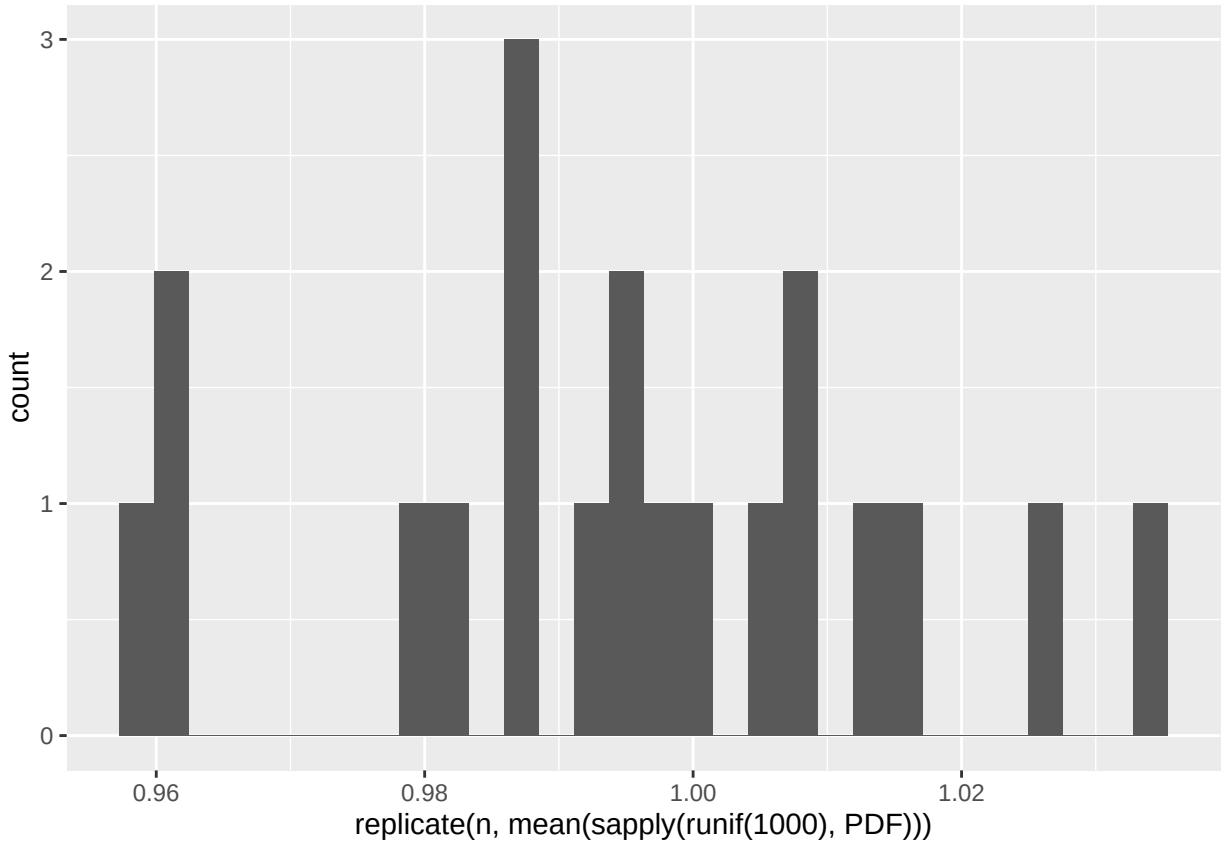
```
centralcalc(20, invcdfgen)
```

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




```
centralcalc(20, invcdfgen2)
```

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


3
2
1
0
count
0.96
0.98
1.00
1.02
replicate(n, mean(sapply(runif(1000), PDF)))