

(a)

```
set.seed(2023)
rep_times <- 10000
sample_means <- rep(NA,rep_times)
for ( i in 1:rep_times){
  sample_means[i] = mean(rgamma(1,shape=2,scale=5))
}
```

```
print(mean(sample_means))
```

i

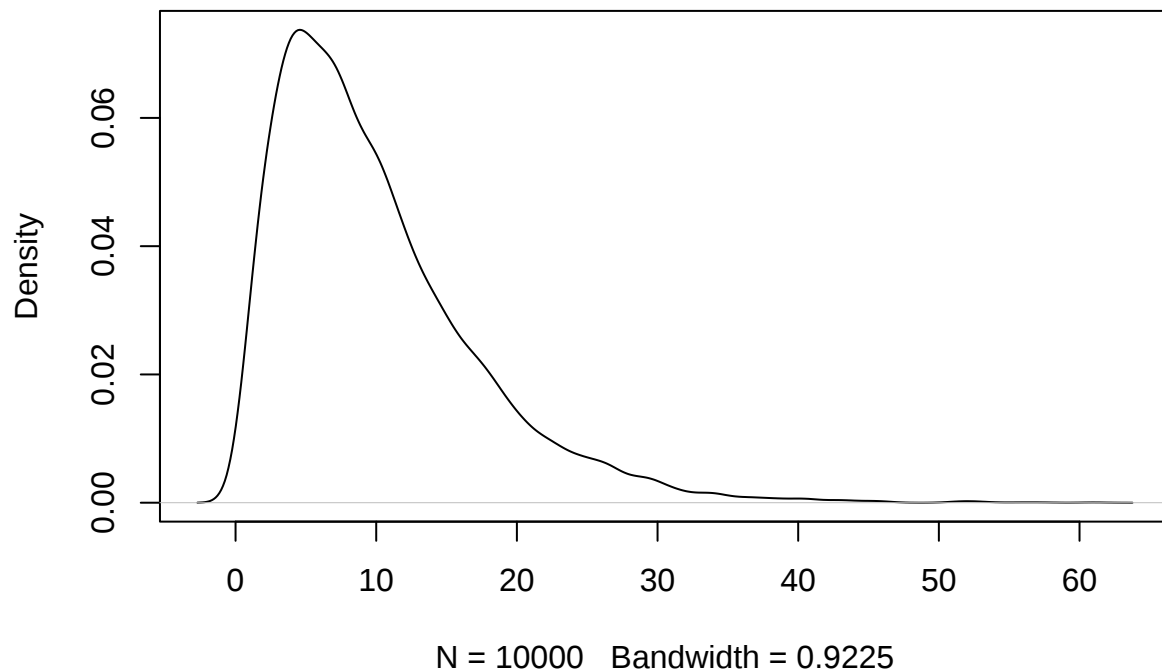
```
## [1] 9.961578
```

```
print(var(sample_means))
```

```
## [1] 50.87257
```

The mean and variance are very close to the theoretical mean and therotical variance, respectively.

```
plot(density(sample_means),main="")
```



ii.

When the sample size is 1, the distribution of the sample mean also follow gamma distribution with $\alpha = 2$ and $\beta = 5$. So, the shape of the plot corresponds to a gamma distribution.