Homework 1

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Problem 1 We can conduct a z-test since the data is normal distributed.

$$H_0 : \mu = 0.5 \quad \text{vs} \quad H_1 \neq 0.5,$$

$$\hat{z} = \frac{0.724 - 0.5}{\frac{1}{\sqrt{10}}} = 0.71.$$

The p-value is 0.48, thus we can not reject the null hypothesis.

Problem 2 First, compute the p-value

$$p = P(X \geq 10) = P(X = 10) + \cdots + P(X = 16) = 0.06.$$
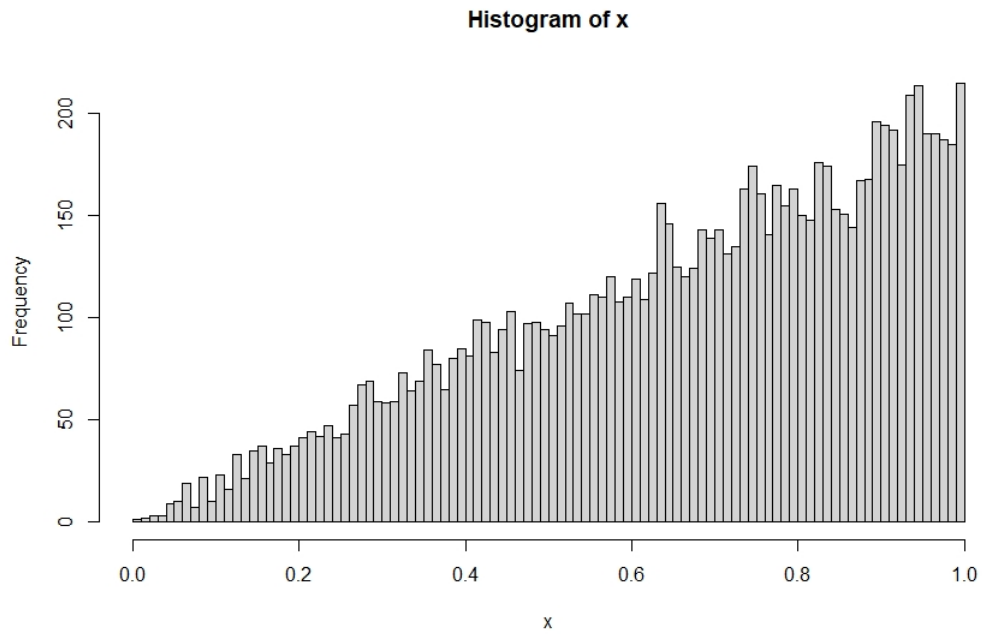
Since $n\mu_0 = 6.4 > 5$ and $n(1 - \mu_0) = 9.6 > 5$, normal approximation can be applied. Thus

$$\hat{z} = \frac{\hat{\mu} - 0.4}{\sqrt{0.4 \times 0.6/16}} = 1.84.$$
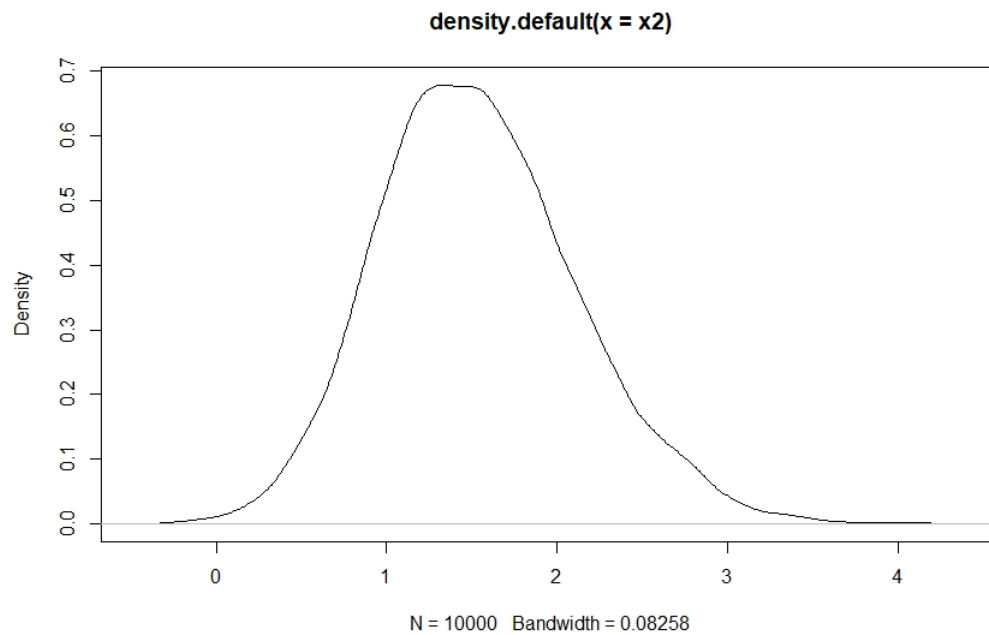
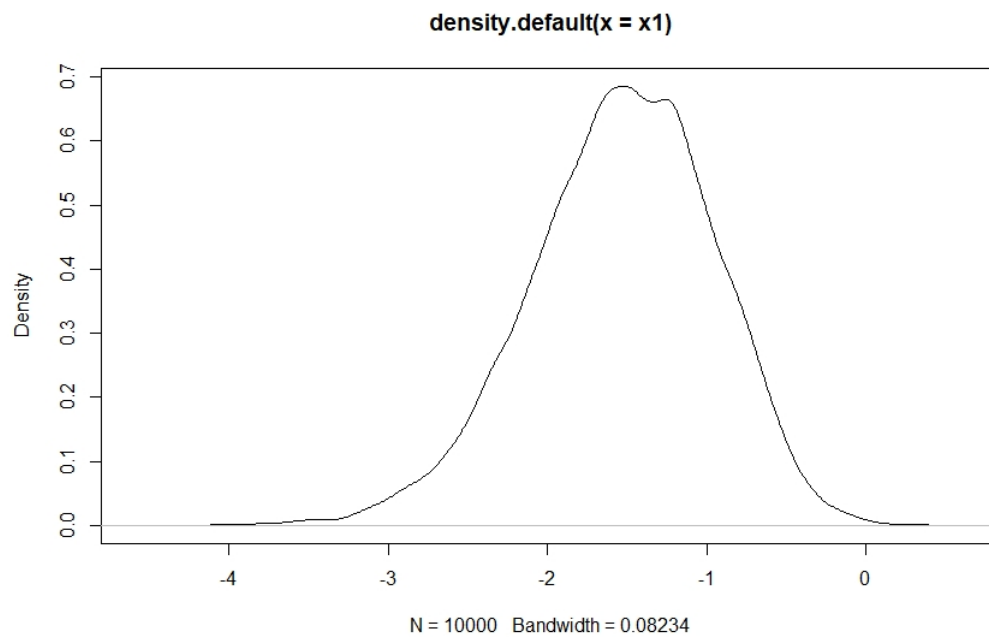We have to reject the null hypothesis.'

Problem 3

```
1 > x=sqrt(runif(10000,0,1))
2 > hist(x,breaks = 100)
```

Histogram of x

Problem 4

```
1 > x1=replicate(n=10000,expr = min(rnorm(10,0,1)))
2 > x2=replicate(n=10000,expr = max(rnorm(10,0,1)))
3 > plot(density(x1))
4 > plot(density(x2))
```

density.default(x = x1)

N = 10000   Bandwidth = 0.08234

density.default(x = x2)

N = 10000   Bandwidth = 0.08258

4

Problem 5

```
1 > mean(x1)
2 [1] -1.53773
3 > var(x1)
4 [1] 0.3354607
```