(Session 19 Group Quiz)

The body temperature in degrees Fahrenheit of $n = 40$ randomly chosen healthy adults is measured. The standard deviation σ is known to be 0.68 degrees Fahrenheit. The sample mean for the measurements is $\bar{x} = 98.37$.

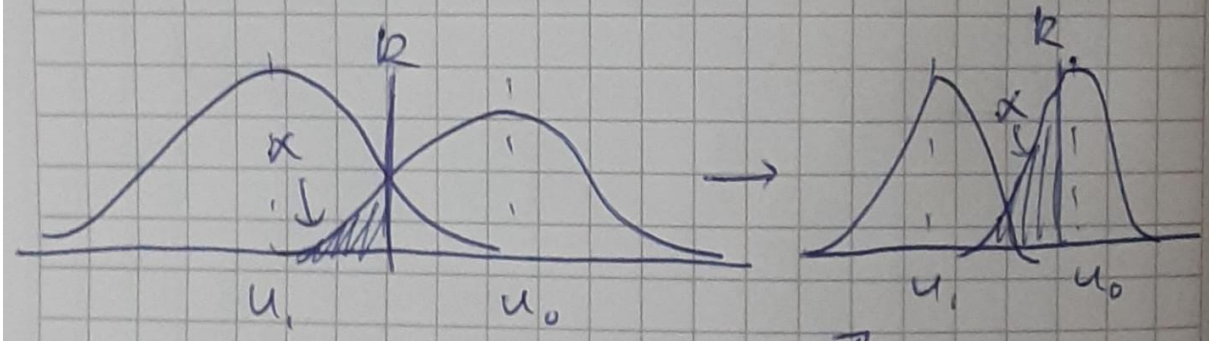
(Do Not Repeat Solutions) You already found a 99% confidence interval for the mean body temperature and explained its meaning.

(Do Not Repeat Solutions) Consider the simple hypothesis for the mean body temperature in degrees Fahrenheit, $H_0 : \mu = 98.6 \quad \text{versus} \quad H_1 : \mu = 98.4$. You already gave the critical value for $\bar{x}$, the sample mean body temperature when the significance level $\alpha = 0.05, 0.02$, and 0.01.

q-worksheet

a. Do these critical values increase, decrease, or stay the same in the number of healthy adults chosen increases to $n = 50$? Explain your answer.

(a) If the value of n increases from 40 to 50, we see that the SD decreases. Therefore, to compensate for the Area α, the value of k is taken further towards μ_0. Therefore, if n increases, CRITICAL VALUE also INCREASES



Here, we see that the value of k increases

b. The data have sample mean $\bar{x} = 98.37$. For $n = 40$ and each value of α, report whether or not we reject the null hypothesis? Explain your answer.

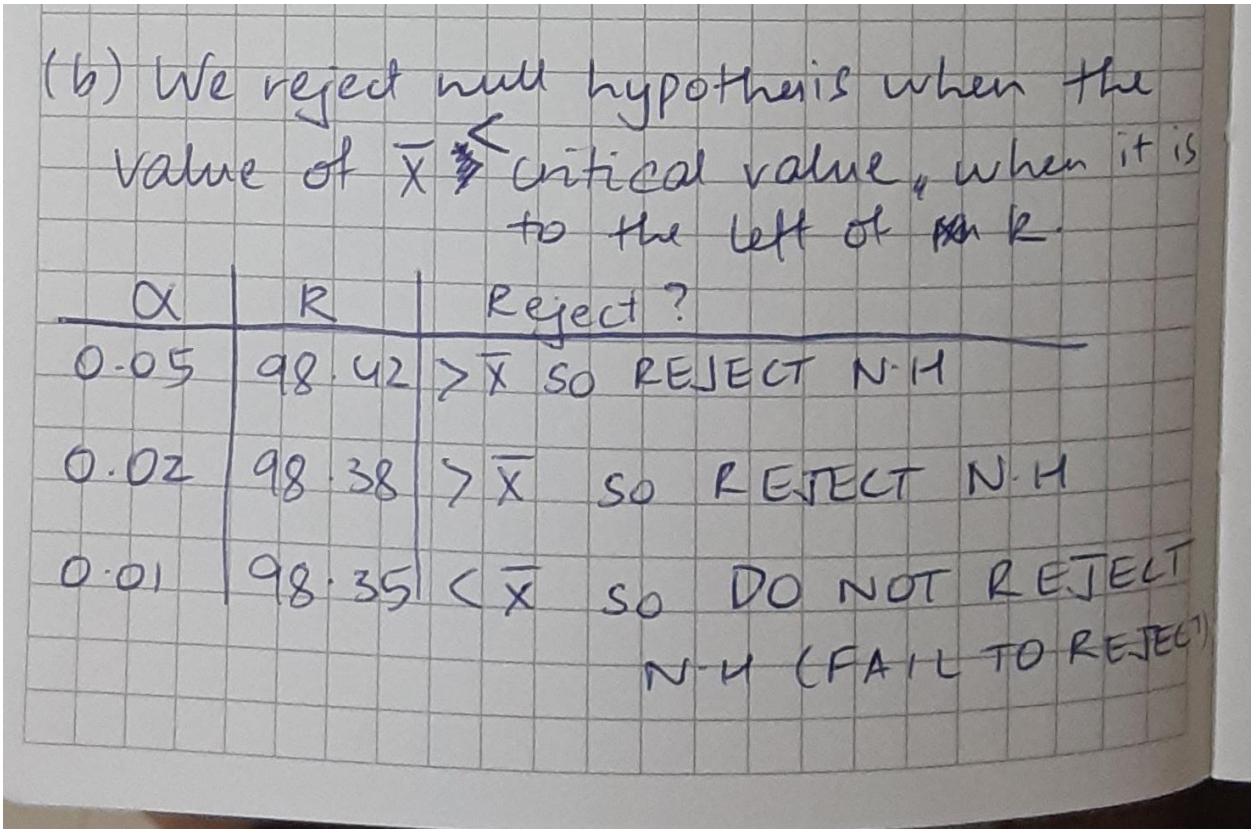


Figure 1: Part(b)

c. Find the power of the test in part (b) for each significance level.

	significance		
	0.05	0.02	0.01
power			

```
z1<-(98.42315 - 98.4)/(0.68/sqrt(40))
z2<-(98.37919 - 98.4)/(0.68/sqrt(40))
z3<-(98.34988 - 98.4)/(0.68/sqrt(40))
cat("Value of power for alpha = 0.05: ", pnorm(z1), "\n")
```

```
## Value of power for alpha = 0.05:  0.5852387
```

```
cat("Value of power for alpha = 0.02: ", pnorm(z2), "\n")
```

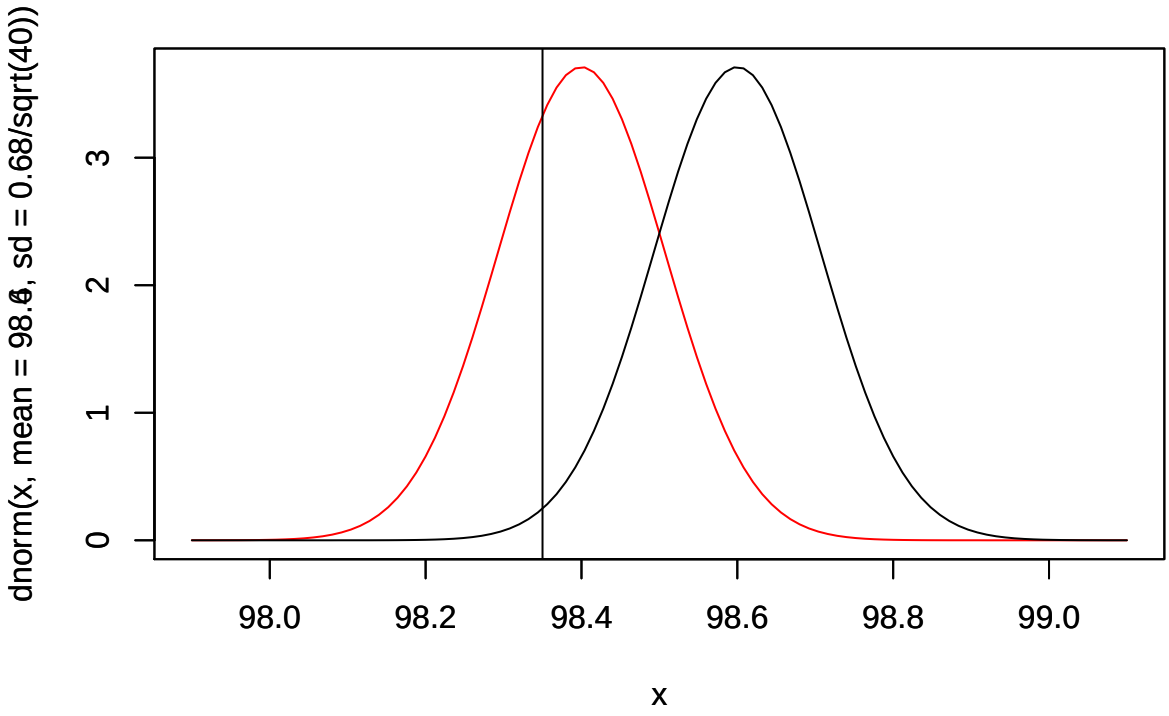
```
## Value of power for alpha = 0.02:  0.4232641
```

```
cat("Value of power for alpha = 0.01: ", pnorm(z3), "\n")
```

```
## Value of power for alpha = 0.01:  0.3205516
```

d. For $\alpha = 0.01$, indicate the power using the critical value for the test and drawing the density of the sample mean $\bar{X}$ for the null and alternative hypothesis.

```
curve(dnorm(x, mean = 98.4, sd = 0.68/sqrt(40)), from = 97.9, to = 99.1, col = "red")
par(new = TRUE)
curve(dnorm(x, mean = 98.6, sd = 0.68/sqrt(40)), from = 97.9, to = 99.1)
abline(v = 98.35)
```



The shaded area indicated on the next page is the power, that is, the area to the left of the critical value under the curve for the alternative hypothesis.

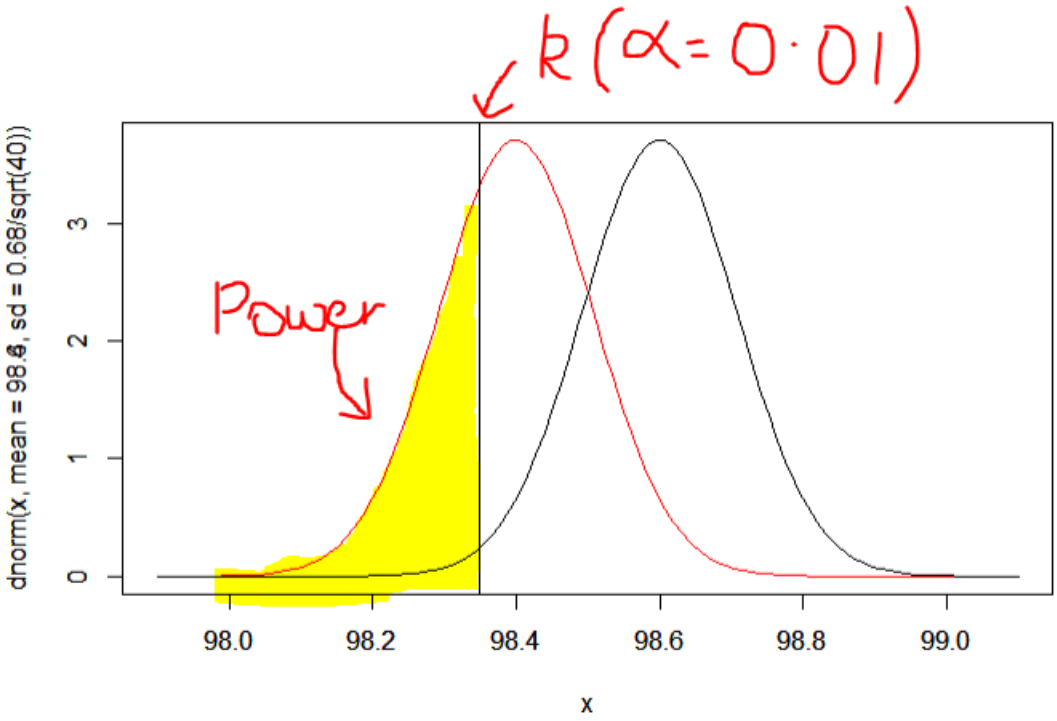


Figure 2: Part(d)