quiz3.2

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3/14/2018

a.

$\bar{X}$ has to be normally distributed, and since $n > 30$ we can apply the CLT so that $\bar{X}$ is approximately normal.

b.

We calculate the test statistics and do the hypothesis test:

```
x = c(37.506, 48.336, 47.933, 47.308, 36.847, 43.913, 38.736, 44.170,
      36.730, 48.953, 37.070, 37.676, 42.989, 45.139, 41.713, 43.729,
      50.177, 39.286, 24.366, 39.223, 37.797, 34.548, 45.478, 46.081,
      37.388, 43.448, 44.139, 43.140, 45.982, 48.182, 43.172, 43.907,
      43.562, 38.768, 49.510, 47.144, 38.030, 42.148, 45.007, 36.556)
xbar = mean(x)
xsigma = sd(x)
test.stat = (xbar-40)/(xsigma/sqrt(40))
# assuming t-distribution here for the test statistics
(pvalue1=2-2*pnorm(test.stat))
```

```
## [1] 0.008458537
```

```
pvalue1<0.1
```

```
## [1] TRUE
```

```
# assuming normal distribution here for the test statistics
(pvalue2=2-2*pt(test.stat,39))
```

```
## [1] 0.01206218
```

```
pvalue2<0.1
```

```
## [1] TRUE
```

p-value of the test statistics is smaller than 0.1 so we can reject the null hypothesis.

c.

```
# assuming t-distribution here for the test statistics
conf.int.t = c(xbar-qt(0.975,39)*xsigma/sqrt(40),xbar+qt(0.975,39)*xsigma/sqrt(40))
conf.int.t
```

```
## [1] 40.49724 43.79211
```

```
# assuming normal distribution here for the test statistics
conf.int.n = c(xbar-qnorm(0.975)*xsigma/sqrt(40),xbar+qnorm(0.975)*xsigma/sqrt(40))
conf.int.n
```

```
## [1] 40.54833 43.74102
```

d.

Since 43.7 is in the confidence interval in part c, we don't reject the null hypothesis.