Assignment 6

48

$n = 54$, $\bar{x} = 33,77$, $\sigma = 15$

a) 95% confidence $\rightarrow$ $z_{\alpha/2} = 1,96$

$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 1,96 \cdot \frac{15}{\sqrt{54}} = 4,0008$

The margin of error is 4,0008

b) $33,77 \pm 4,0008$

$33,77 - 4,0008 = 29,7692$
$33,77 + 4,0008 = 37,7708$

95% confidence interval for μ : [29.7692 , 37.7708]

50

$n = 80$, $\bar{x} = 1873$, $s = 550$

a) $E = t_{\alpha/2} \frac{s}{\sqrt{n}} = t_{0,025} \frac{s}{\sqrt{n}}$ $\Rightarrow$ 1,99
$df = n - 1 = 80 - 1 = 79$

$E = 1,99 \cdot 550/\sqrt{80} = 122,369$

The margin of error is 122,369

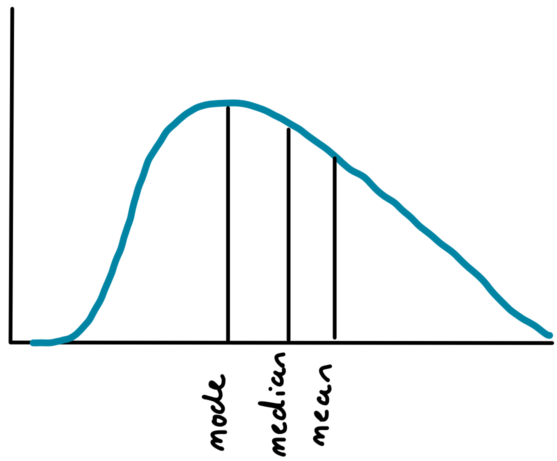
b) $1873 \pm 122,369$

95% confidence interval for μ = [1750.631, 1995.369]

c) $N = 92\ 000\ 000$

Estimate = [161.058.052.000, 183.573.948.000]

Americans of age 50 and over probably spend between 161 and 183 billion dollars in total on resturants and carry out food annually d)



From the graph, we can see that if the amount is skewed to the right, the median is less than the mean. The median amount should therefore be less than $1873

52 see python file

d) The confidence interval in a) has the largest margin of error, because the sample standard deviation is bigger.

57

$\bar{p} = 0{,}47$, $n = 450$, $np = 211 > 5 \rightarrow$ approximately normal distribution

a) 95 % confidence: $z_{\alpha/2} = 1{,}96$

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0{,}47 \pm 1{,}96 \cdot \sqrt{\frac{0.47 \cdot 0.53}{450}} = 0{,}47 \mp 0{,}0461$$

The 95% confidence interval for the population proportion: [0,4239 , 0,5162]

b) 99 % confidence: $z_{\alpha/2} = 2{,}576$

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0{,}47 \pm 2{,}576 \cdot \sqrt{\frac{0.47 \cdot 0.53}{450}} = 0{,}47 \mp 0{,}0601$$

The 99% confidence interval for the population proportion is [0,4094 , 0,5306]

c) The margin of error increased as the confidence increased. To be more confident, we use wider intervals with a larger margin of error.

59

$\bar{p}_{snap} = 0{,}78$, $\bar{p}_{twitter} = 0{,}45$, $n = 500$

Since n is so big, we can use normal distribution.

a) 95 % confidence: $z_{\alpha/2} = 1{,}96$

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0{,}78 \pm 1{,}96 \cdot \sqrt{\frac{0.78 \cdot 0.22}{500}} = 0{,}78 \mp 0{,}0363$$

The 95% confidence interval for the population proportion: [0,7437 , 0,8163]

b) 99% confidence : $z_{\alpha/2} = 2{,}576$

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0{,}45 \pm 2{,}576 \cdot \sqrt{\frac{0.45 \cdot 0.65}{500}} = 0{,}45 \pm 0{,}0574$$

The 99% confidence interval for the population proportion is [0,4026 , 0,5174]

c) The margin of error is bigger in b) because the confidence interval is bigger.
To be more confident, we use wider intervals with a larger margin of error.

67 see python file

I conclude that a large proportion of the reports filed from Florida deals with instances of fraud, and that the margin of error in a 95% confidence interval is quite small.