JOHN ADAMSKI
5/9/2017

LET'S GET THIS OUT OF THE WAY:

CONFIDENCE LEVEL	α	$z_{\alpha/2}$
90%	.1	1.645
95%	.05	1.96
98%	.02	2.33
99%	.01	2.58

* INTERVALS CONSTRUCTED IN THIS WAY CONTAIN THE TRUE VALUE OF μ 95% OF THE TIME"

24. (a) $\bar{x} \pm z_{\alpha/2}\sqrt{\frac{s^2}{n}}$, $\alpha \in .05$

$13.1 \pm 1.96\sqrt{\frac{3.42}{36}} \approx 13.1 \pm .6041$

$[12.4959, 13.7041]$

(b) $2.73 \pm 1.96\sqrt{\frac{.1047}{64}} = 2.73 \pm .0793$

$[2.6507, 2.8093]$

25. Now $z_{\alpha/2} = 1.645$

(a) $.84 \pm 1.645\sqrt{\frac{.086}{125}} \approx .84 \pm .0431 \rightarrow [.7969, .8831]$

(b) $21.9 \pm 1.645\sqrt{\frac{3.44}{50}} \approx 21.9 \pm .4315 \rightarrow [21.4685, 22.3315]$

(c) WITH REPEATED RANDOM SAMPLING, INTERVALS CONSTRUCTED IN THIS WAY CONTAIN THE TRUE VALUE OF μ 90% OF THE TIME.

26. (a) $34 \pm 2.58\sqrt{\frac{12}{38}} = 34 \pm 1.4498 \rightarrow \boxed{[32.5502, 35.4498]}$

(b) $1049 \pm 1.645\sqrt{\frac{51}{65}} = 1049 \pm 1.4571 \rightarrow \boxed{[1047.5429, 1050.4571]}$

(c) $66.3 \pm 1.96\sqrt{\frac{2.48}{89}} = 66.3 \pm .3272 \rightarrow \boxed{[65.9728, 66.6272]}$

27. $\hat{p} = \frac{x}{n} = \frac{263}{300} \approx .8767$

$\hat{p} \pm 1.645(S.E.) = .8767 \pm 1.645\sqrt{\frac{(.8767)(.1233)}{300}}$

$\approx .8767 \pm .0312 \rightarrow \boxed{[.8455, .9079]}$

IF SAMPLES OF SIZE 300 WERE TAKEN REPEATEDLY, AND INTERVALS WERE CONSTRUCTED IN THIS WAY EACH TIME, 90% OF THESE INTERVALS WOULD CONTAIN THE PARAMETER p.

28. $\hat{p} = \frac{27}{500} = .054$

$\hat{p} \pm 1.96\sqrt{\frac{(.054)(.946)}{500}} = .054 \pm .0198 \rightarrow \boxed{[.0342, .0738]}$

BECAUSE n IS BIGGER.

29. (a) THE WIDTH OF THE INTERVAL $\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}}$ IS $2(1.96)\frac{\sigma}{\sqrt{n}}$

$$2(1.96)\left(\frac{10}{\sqrt{100}}\right) = \boxed{3.92}$$

(b) $$2(1.96)\left(\frac{10}{\sqrt{200}}\right) = \boxed{2.7719}$$

(c) $$2(1.96)\left(\frac{10}{\sqrt{400}}\right) = \boxed{1.96}$$

30. (a) DIVIDE WIDTH BY $\sqrt{2}$

(b) DIVIDE WIDTH BY 2

31. (a) $$2(1.645)\frac{10}{\sqrt{100}} = \boxed{3.29}$$

(b) $$2(2.58)\frac{10}{\sqrt{100}} = \boxed{5.16}$$

(c) INCREASING THE CONFIDENCE COEFFICIENT INCREASES THE WIDTH OF THE CONFIDENCE INTERVAL.

32. $$\bar{x} \pm 1.645\,(S.E.) = .145 \pm 1.645\left(\frac{.0051}{\sqrt{30}}\right)$$

$$= 1.45 \pm .0015 \longrightarrow \boxed{[\,1.4485\,,\ 1.4515\,]}$$

33. $\bar{x} \pm 2.58(S.E.) \approx 3.7 \pm 2.58\left(\frac{.5}{\sqrt{40}}\right)$

$= 3.7 \pm .2040 \rightarrow \boxed{[3.496, 3.904]}$

99% OF INTERVALS CONSTRUCTED IN THIS WAY CONTAIN μ.

SAMPLE MUST BE RANDOM.

34. (a) $54 \pm 1.96\left(\frac{12.7}{\sqrt{1136}}\right) = 54 \pm .7385 \rightarrow [53.2615, 54.7385]$

(b) $72 \pm 1.96\left(\frac{10.4}{\sqrt{795}}\right) = 72 \pm .7229 \rightarrow [71.2771, 72.7229]$

35. (a) $1.01 \pm 2.58\left(\frac{.18}{\sqrt{35}}\right) = 1.01 \pm .0785 \rightarrow [.9315, 1.0885]$

(b) IF RANDOM SAMPLES OF SIZE 35 ARE REPEATEDLY TAKEN AND INTERVALS ARE CONSTRUCTED IN THIS WAY, 99% OF THE INTERVALS PRODUCED WILL CONTAIN THE TRUE POPULATION MEAN μ.

(c) No. 1 IS IN THIS INTERVAL, SO ALL IS GOOD.

36. (a) $\hat{p} \pm 1.645\sqrt{\frac{\hat{p}\hat{q}}{n}} = .4 \pm 1.645\sqrt{\frac{(.4)(.6)}{1082}} = .4 \pm .0245$

$\rightarrow [.3755, .4245]$

(b) $.3 \pm 1.645\sqrt{\frac{(.3)(.7)}{1082}} = .3 \pm .0229 \rightarrow [.2771, .3229]$

(c) I DON'T KNOW, BUT A 95% CONFIDENCE INTERVAL WITH $p = .5$ PRODUCES A MARGIN OF ERROR $= .0298 \approx .03 \rightarrow 3\%$.

37. (a) $\frac{68}{500} \pm 1.96\sqrt{\frac{(.136)(.864)}{500}} = .136 \pm .030 \rightarrow [.106, .166]$

$\frac{68}{500} = .136$

(b) INCREASE SAMPLE SIZE OR
DECREASE CONFIDENCE LEVEL (THEN WIDTH OF CONFIDENCE INTERVAL GETS SMALLER - i.e. "MORE ACCURATE")

38. (a) $112.5 \pm 1.96\left(\frac{4.6}{\sqrt{60}}\right) = 112.5 \pm 1.1640 \rightarrow [111.336, 113.664]$

(b) YES, CONFIDENCE INTERVAL IS CONTAINED INSIDE $[100, 120]$.

39. (a) $98.25 \pm 2.58\left(\frac{.73}{\sqrt{130}}\right) = 98.25 \pm .1652 \rightarrow [98.0848, 98.4152]$

(b) No. THIS SUGGESTS THAT THE TRUE MEAN BODY TEMPERATURE IS LOWER THAN 98.6°.

40. (a) $.77 \pm 2.33\sqrt{\frac{(.77)(.23)}{469}} = .77 \pm .0453 \rightarrow [.7247, .8153]$

85% IS NOT REALISTIC

(b) $.65 \pm 2.58\sqrt{\frac{(.65)(.35)}{490}} = .65 \pm .0556 \rightarrow [.5944, .7056]$