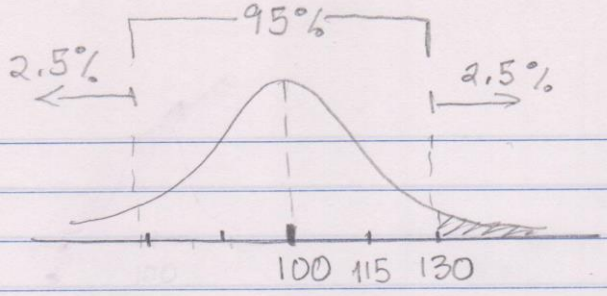
Empirical Rule

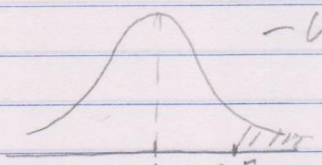


Answer

1. $\mu = 100$
$\sigma = 15$

d.

2. $\mu = 18$
$\sigma = 6$
$x = 33$



$z = \frac{x-\mu}{\sigma} = \frac{33-18}{6} = 2.5$

- use Normal Distrib Calculator

$P(z \geq 2.5) = .0062$

a.

3. StatCrunch results

$\bar{x} = 20.85 \quad S = 5.941$

d

4. $\bar{x} \pm 2S$

$\bar{x} - 2S = 20.85 - 2(5.94)$
$= 8.97$

$\bar{x} + 2S = 20.85 + 2(5.94)$
$= 32.73$

a

Strategy: Use a dotplot or sort the data

5. $\mu = 65.5$ in
$\sigma = 2.5$ in
$x = 6$ ft $= 72$ in

$z = \frac{x-\mu}{\sigma}$

$= \frac{72 - 65.5}{2.5} = 2.6$

a

6. $\mu = 490$ mg
$\sigma = 12$ mg

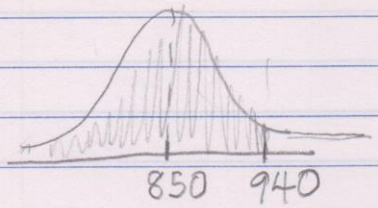
$P(x \geq 500) = P(z \geq .8333) = .2023$

$z = \frac{500-490}{12} =$

e

What % is this?

Ans.

7. 

$z = \frac{940 - 850}{100} = .9$

$P(z \le .9) = .816$

$\approx .82$

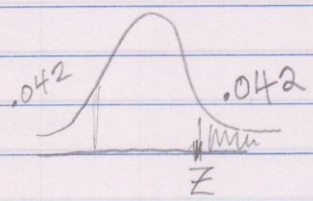
$\Rightarrow$ 82nd Percentile

(b)

8. No work

9. No work

10. No work

11. 

$P(z \ge 1.728) = .042$

e

P-value = .042 < .05 Reject

.042 > .01 Don't reject

P-value = .042 < .10 Reject (e)

12. See test

13. See test

14. See test

15. $p = .35$

$x = 200 \rightarrow \hat{p} = \frac{200}{500} = .40$

$n = 500$

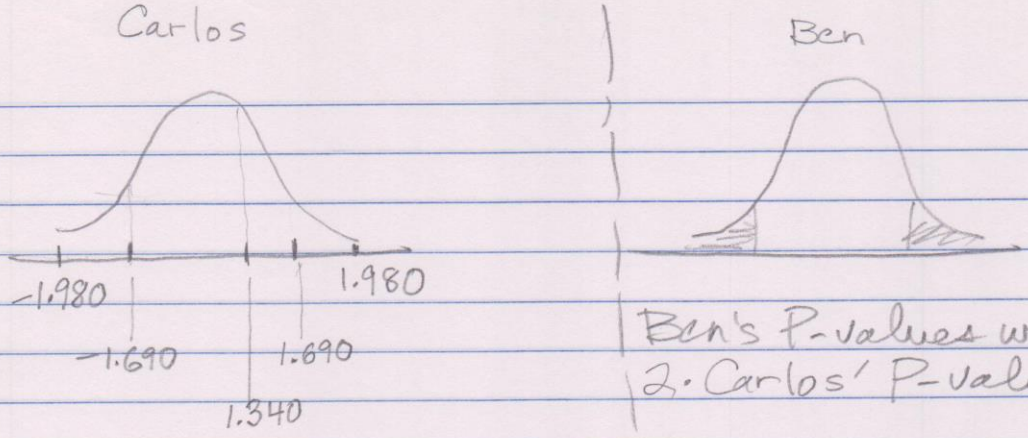
$SE = \sqrt{\frac{.35(.65)}{500}}$

$z = \frac{\hat{p} - p}{SE} = \frac{.40 - .35}{\sqrt{\frac{.35(.65)}{500}}}$

$P(z > \quad)$

c

16.



Ben's P-values will be 2· Carlos' P-values.

Assume neg z-scores are left-tailed, pos. for right tailed

CARLOS

$P(z<-1.980) = P(z>1.980) = .0239$ → Ben's 2-Tailed Test P-value $= 2(.0239) = .0478$

Both are significant

CARLOS

$P(z<-1.690) = P(z>1.690) = .0456$ → Ben's 2-Tailed Test P-value $= 2(.0456) = .0912$

Significant / not significant

CARLOS

$P(z>1.340) = .0901$

BEN

P-value $= 2(.0901) = .1802$

Neither are Significant

Answer: b and d

ANS

17. $\mu = 100$, $\sigma = 15$ } Assume Normal Distribution!

$z = 1.20$ $\quad z = \frac{x-\mu}{\sigma}$ $\quad$ [e]

$15\left(1.2 = \frac{x-100}{15}\right)$

$18 = x - 100 \Rightarrow x = 118$

18. $n = 1600$

Pop $N = 100{,}000$

$\hat{p} = .40$

$z^* = 2.576$

By hand: 99% confidence

CI: $\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

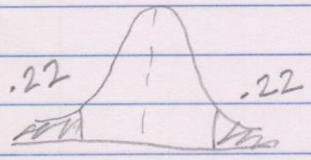
$.40 \pm 2.576 \sqrt{\frac{.4(.6)}{1600}}$

$.40 \pm .0315$

$(.3685, .4315)$

$(.37, .43)$ $\Longrightarrow$ [d]

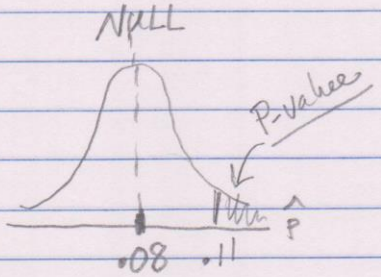
19.



P-value = .44 [c]

21. $H_0: p = .08$

$H_a: p > .08$



$x = 33$ successes

$n = 300$ observ.

$\hat{p} = .11$

$z = \frac{.11 - .08}{\sqrt{\frac{.08(.92)}{300}}} = 1.9153$

StatCrunch:

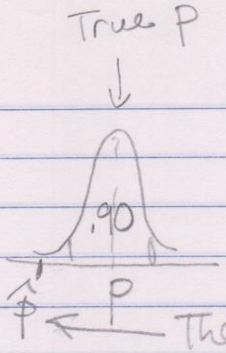
P-value $= P(\hat{p} \geq .11)$

$= P(z \geq 1.9153)$

$= .0277 \rightarrow .028$

[b]

22 $n = 500$
90% CI



There is a 10% chance $\hat{p}$ will be more than z^* SD's away from p.
This means that 90% of the intervals would capture the true p ⟹ c

ANS: a

23 > See test
24

25 $n = 1000$ observations
$x = 334$ successes
90% CI

By hand ok or use StatCrunch ⟹ c
(.30947, .35852)
(.309, .359)

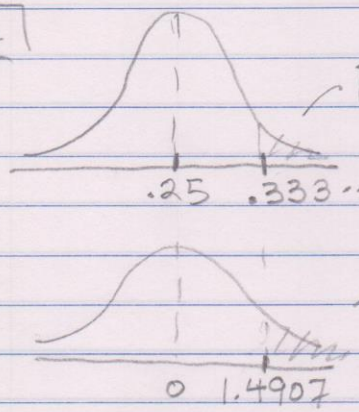
28 $.12 \pm .060 = (.06, .18)$ ⟹ c

$H_0: p = .25$ $\quad x = 20$, $n = 60$

$H_a: p > .25$ $\quad \hat{p} = \frac{20}{60} = .333\ldots$

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{.\overline{3} - .25}{\sqrt{\frac{.25(1-.25)}{60}}} = 1.4907$$

29 (a)



P-value $= P(\hat{p} = .3333)$

$= P(z \geq 1.4907)$

$= .068 > .05$

Fail to reject H_0

30 (b)

31. H_0: no toxin (don't reject batch)

H_a: toxin (do reject batch)

Type II: Fail to reject H_0, H_0 is false

Conclude no evidence for toxin

Toxin is really present!

Don't reject batch $\Rightarrow$ You should! It's poison!

32 Type I: Reject H_0 when H_0 is TRUE

Conclude there's a toxin $\Rightarrow$ no toxin in reality

Discard batch

33. See test