Sampling Distribution of the mean

Mean of the sampling Distribution of the mean

The mean of the sampling distribution of the mean

agreeds the populations mean(x). Formula: Example: Suppose a population has a near leight of 165 cm.

It he take reported sandom samples scan this propulation
the near of all sumple means will also be 165 cm



2) Varsiance of the Sampling Distribution of the near is

The variance of the sampling distribution of the mean is

the population variance (o2) divided by the sample size (N) Formula o2 M = 2 Implication · laseps sample size - smaller variance of the sample near " It the population variance or = 64 and ne take a sample size of N=4 then 2M=64/4=16 3) Stand and Exxon of the Mean (SEM). Re standard Esser of the Man is the Standard divistion of Formula om= 5 Example: if o = 8 and N = 4 ten; om = 8/4 = 4 Interpretation smaller SEM -> Sample mans one none tightly clustered around the population rean 1) Central limit Theorem (CLT) Given any population with rean 24 and frite winte of the sampling distribution of the near approaches a normal detribution as N incoecses, eggs less the shape of to

original population.

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For small N, the sampling distribution may not be Nood for large N (typically N > 30), the distribution becomes approximately hornal. key to Kearays

5) Practical Impostance of CLT

o Why is (LT Imporbant?

> Albus statistical sintereence (eg codidence interals, hypothesis

+ Estig) even when the populations at now!

· Justities using z-scores and +-test when sample sizes are Sydticiontly lage

Pag) world application
Suppose no want to estimate the granage income of wridents in

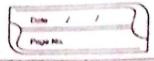
The income distribution my be sight-skind (some people our much most than most)

with trafe enough camples, the cample mean distribution in benerval, making it asses to analyze.

Sampling Distribution of the Difference Deticen wears

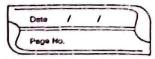
1) Mean of the sampling Distribution of the Diddesence between wars Re mean of the sampling distribution of the difference when Hear two sample reans is equal to the di Stornce between the two population means formula

JUM 1-M2 = 24- des



Example: Id The man test score of IR year ob 1534 and that at 10 year old is 25 then P=25-45 = 24-25=9 2) Variance of the sampling distribution of the difference between reans Od the Jampling distribution of the andividual read Formula 05 MJ-MS = 151 + 055 3) Standard Estor of the Piddesence between rems The standard error is the square root of the variance of the v Example: Inv Matain species - species I mean theight=32, variance=60, complete b speces 2: Mean Leight: 37, variance=70, sandiche 14 · Mean of the Distoibution: MM1-M2 = 37-27 = 10 · Standard expor のMI-MZ= V等 + 哲 = 3-377 To compute probabilities, no sind the z-scor de a gun describe Letican read Z = (Ma-MZ) - 244 -MZ - M= -M2

Wal



1446	Example (Mastian Species)
	Poobability that Species I's mean Hight exceeds spaid!
	by at leas 5
	7 = 5-30 = -1.51
- 0	$z = 5 - \frac{7}{2}c = -1.51$ Using a $z - 4able$, the probability is 0.934
	7 14 Y
5,	Siemplitied formula for equal sample sizes and variances
	It na = nz and o 1 = . oz ten:
	5Mg-M2 = \ 202
	n
	Example (Boys US Givis reight Study):
328 F	Boys: Mean: 175; Varianco: 64, sample sice-8
	Cirols: Mean 765 variance: 64, sumple size &
	Man at the difference $24M_2-M_2=165-175=-10$
2	Standard Exxos 0112-112 = 3(64) = = 4
	Probability that girls rean > boys rean
	7 = 0 - (-10) = 7.5
	4 - (-5
	from a z table the pubability is 0.0067 lay valida
	the state of the s
	