Statistics

Lecture 19

Feb 19-8:47 AM

Class Qz 9

Consider a binomial prob. dist. with $n=175$ & $P=.6$

1) find its mean of Successes.

$\mu = np = 175(.6) = \boxed{105}$

2) find the prob. of at most 115 Successes.

$P(x \leq 115) = \text{binomcdf}(175, .6, 115) = \boxed{.948}$

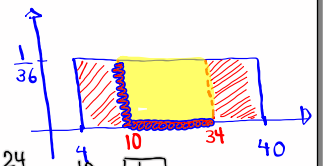
Nov 22-6:49 AM

Consider a uniform Prob. dist for all values from 4 to 40.

1) $P(x<10 \text{ or } x>34)$

$= 1 - P(10<x<34)$

$= 1 - (34-10)\cdot\frac{1}{36} = 1 - \frac{24}{36} = \frac{12}{36} = \boxed{\frac{1}{3}}$



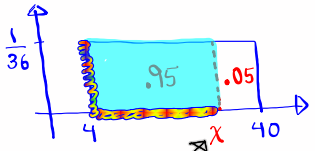
2) Find $x = P_{95}$

$(x-4)\cdot\frac{1}{36} = .95$

$x - 4 = 36(.95)$

$x - 4 = 34.2$

$\boxed{x = 38.2}$

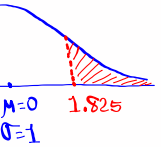


Nov 22-7:37 AM

1) Find twice the area to the right of $Z = 1.825$

2*normalcdf(1.825, E99, 0, 1)

$= \boxed{.068}$

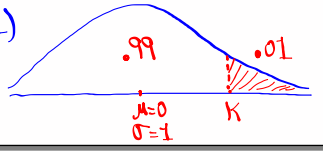


2) Find K such that $P(Z>K) = .01$.

(Right Area)

$K = \text{invNorm}(.99, 0, 1)$

$= \boxed{2.326}$



Nov 22-7:45 AM

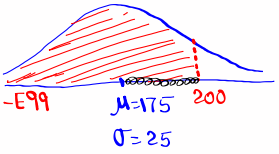
Consider a normal Prob. dist. with the mean of 175 and standard deviation of 25.

$N(175, 25)$

1) $P(x < 200)$

= normalcdf(-E99, 200, 175, 25)

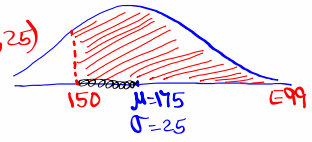
= .841



2) $P(x > 150)$

= normalcdf(150, E99, 175, 25)

= .841

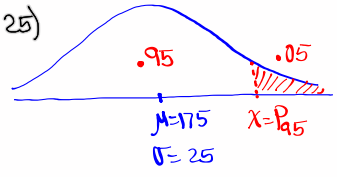


3) Find $x = P_{95}$, Round to whole #

x = invNorm(.95, 175, 25)

= 216.121

≈ 216



Nov 22-7:52 AM

Ages of nurses are normally dist. with the mean of 41.5 yrs and standard deviation of 7.4 years. $N(41.5, 7.4)$

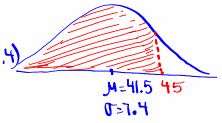
If we randomly select one nurse, find the Prob. that his/her age (x) is

1) below 45 Yrs

$P(x < 45)$

= normalcdf(-E99, 45, 41.5, 7.4)

= .682

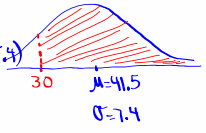


2) above 30 Yrs.

$P(x > 30)$

= normalcdf(30, E99, 41.5, 7.4)

= .940



3) Find the age (x), round to 1-decimal, that separates the bottom 10% from the rest.

Left Area

x = invNorm(.1, 41.5, 7.4)

= 32.017

≈ 32.0

SG 18 & 19

Nov 22-8:01 AM

SG 20

Clear all lists: 2nd [+] 4:Clear all lists Enter

Re Set all lists: STAT Edit 5:Set up Editor Enter

Store 2, 4, 6, and 8 in L1

Use 1-Var Stats with L1 To find

$\mu = \bar{x} = 5$ $\quad \sigma = \sigma_x = 2.236$ $\quad \sigma^2 = 5$

Take all Samples of Size 2 with replacement From the list.

2,2	2,4	2,6	2,8
4,2	4,4	4,6	4,8
6,2	6,4	6,6	6,8
8,2	8,4	8,6	8,8

Now find $\bar{x}$ of each Sample

2	3	4	5
3	4	5	6
4	5	6	7
5	6	7	8

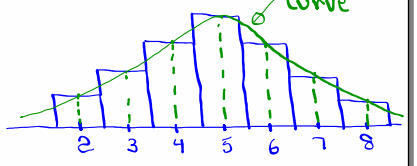
16 means

$\bar{x}$	$P(\bar{x})$
2	1/16
3	2/16
4	3/16
5	4/16
6	3/16
7	2/16
8	1/16

Nov 22-8:29 AM

$\bar{x}$	$P(\bar{x})$
2	1/16
3	2/16
4	3/16
5	4/16
6	3/16
7	2/16
8	1/16

Draw Prob. dist. histogram using $\bar{x}$ & $P(\bar{x})$ Normal Curve



$\bar{x} \rightarrow L2$, $P(\bar{x}) \rightarrow L3$

Use 1-Var Stats with L2 & L3 to find

$\mu = 5$ $\quad \sigma = 1.581$ $\quad \sigma^2 = 2.5 = 5/2$

Nov 22-8:41 AM

Clear all lists.

Store 1, 3, 5, 7, and 9 in L1.

Use [1-Var Stats] with [L1] to find

$\mu = 5$ $\sigma = 2.828$ $\sigma^2 = 8$

Find all samples with [size 2] with replacement from this list.

1,1	1,3	1,5	1,7	1,9
3,1	3,3	3,5	3,7	3,9
5,1	5,3	5,5	5,7	5,9
7,1	7,3	7,5	7,7	7,9
9,1	9,3	9,5	9,7	9,9

Find $\bar{x}$ of each sample

1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8
5	6	7	8	9

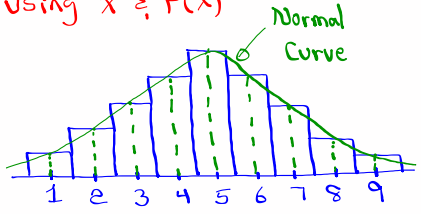
25 means

$\bar{x}$	$P(\bar{x})$
1	1/25
2	2/25
3	3/25
4	4/25
5	5/25
6	4/25
7	3/25
8	2/25
9	1/25

Nov 22-8:49 AM

$\bar{x}$	$P(\bar{x})$
1	1/25
2	2/25
3	3/25
4	4/25
5	5/25
6	4/25
7	3/25
8	2/25
9	1/25

Draw Prob. dist. histogram using $\bar{x}$ & $P(\bar{x})$



$\bar{x} \rightarrow L2$, $P(\bar{x}) \rightarrow L3$

Use [1-Var Stats] with [L2 & L3] to find

$\mu = 5$ $\sigma = 2$ $\sigma^2 = 4 = \frac{8}{2}$

Nov 22-8:59 AM

Central – Limit Theorem

$\mu_{\bar{x}} = \mu$

$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n}$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

Suppose $N(75, 12)$

We take all Sample of Size 4

$\mu_{\bar{x}} = \mu = 75$

By CLT

$\sigma_{\bar{x}}^2 = \frac{\sigma^2}{n} = \frac{12^2}{4} = 36$ ✓

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{4}} = \frac{12}{2} = 6$

Nov 22-9:07 AM

Salaries of nurses are normally dist. with $\mu = \$6500$ and $\sigma = \$500$

If we take all Samples of Size 5 ($n=5$)

$\mu_{\bar{x}} = \mu = 6500$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{500}{\sqrt{5}} \approx 224$

Nov 22-9:13 AM

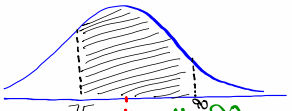
Exam Scores are normally dist. with $\mu = 80$ and $\sigma = 10$. $N(80, 10)$

If we randomly select $n=4$ 4 exams, find the Prob. that their mean Score ($\bar{x}$) is between 75 & 90.

$P(75 < \bar{x} < 90)$

= normalcdf(75, 90, 80, 5)

= .819



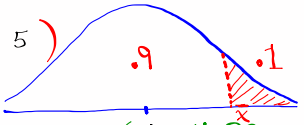
CLT $\mu_{\bar{x}} = \mu = 80$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = 5$

Find $\bar{x} = P_{90}$ for randomly selected groups of 4.

$\bar{x}$ = invNorm(.9, 80, 5)

= 86.408

$\approx$ 86 whole #



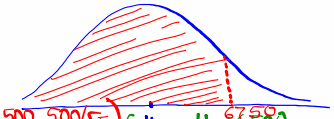
CLT $\mu_{\bar{x}} = \mu = 80$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = 5$

Nov 22-9:15 AM

Salaries of nurses are N.D. with $\mu = \$6500$ & $\sigma = \$500$. $N(6500, 500)$

If we randomly select $n=5$ 5 nurses, find the Prob. that their mean ($\bar{x}$) Salary is below $6750.

$P(\bar{x} < 6750)$



= normalcdf(−E99, 6750, 6500, 500/√5)

= .868

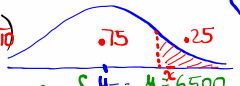
CLT $\mu_{\bar{x}} = \mu = 6500$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{500}{\sqrt{5}}$

Find $\bar{x} = Q_3$ for randomly selected groups of 10 nurses

$\bar{x}$ = invNorm(.75, 6500, 500/√10)

= 6606.646

$\approx$ 6607 whole #



CLT $\mu_{\bar{x}} = \mu = 6500$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{500}{\sqrt{10}}$

Nov 22-9:26 AM

Class QZ 10

1) Consider a geometric Prob. dist with $p=.75$

Find $P(x \leq 4)$

$P(x \leq 4) = \text{geometcdf}(.75, 4) = \boxed{.996}$

2) Consider a poisson Prob. dist. with $\mu = 6$

Find $P(x \geq 4)$

$P(x \geq 4) = 1 - P(x \leq 3) = 1 - \text{poissoncdf}(6, 3) = \boxed{.849}$

Nov 22-9:40 AM