Statistics

Lecture 14

Feb 19-8:47 AM

Consider a binomial Prob. dist. with 175 trials and .6 prob. of success per trial.

1) $n = 175$

2) $P = .6$

3) $q = 1 - P = .4$

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

5) $\sigma^2 = npq = 175(.6)(.4) = \boxed{42}$

6) $\sigma = \sqrt{\sigma^2} = \sqrt{42} \approx \boxed{6.5}$

7) Usual Range / 95% Range $\quad \mu \pm 2\sigma = 105 \pm 2(6.5) = 105 \pm 13 \rightarrow \boxed{92 \text{ to } 118}$

8) P(exactly 110 Successes)

$P(x = 110) = \text{binompdf}(175, .6, 110) \approx \boxed{.046}$

9) P(at most 110 Successes)

$P(x \leq 110) = \text{binomcdf}(175, .6, 110) \approx \boxed{.802}$

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10) P(at least 110 Successes)

$P(x \geq 110) = 1 - P(x \leq 109)$

we don't want 109 110 | we want

$= 1 - \text{binomcdf}(175, .6, 109)$

$= \boxed{.245}$

11) P(# of Successes is between 100 and 115, inclusive)

$P(100 \leq x \leq 115) = \text{binomcdf}(175, .6, 115) - \text{binomcdf}(175, .6, 99)$

$P(x \leq 115)$ | $P(x \leq 99)$ 99 100 115

$= \boxed{.751}$

SG 16 on page 4 use exact value for p & q.

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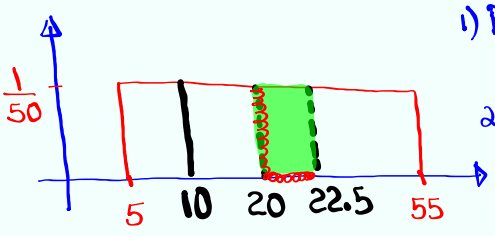
Consider a uniform Prob. dist. for all values from 5 to 55.

1) $P(x = 10) = \boxed{0}$



2) $P(20 < x < 22.5) = (22.5 - 20) \cdot \frac{1}{50}$

$= \frac{2.5}{50} = \boxed{.05} = \frac{1}{20}$

3) Find a value that Separates the top 10% from the rest.

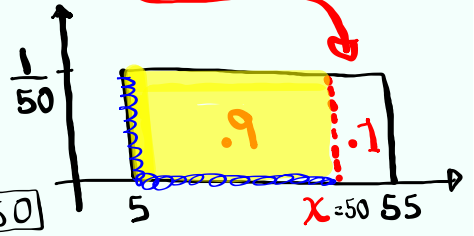
$(x - 5) \cdot \frac{1}{50} = .9$

Multiply by 50

$x - 5 = 50(.9)$

$x - 5 = 45$

$\boxed{x = 50}$



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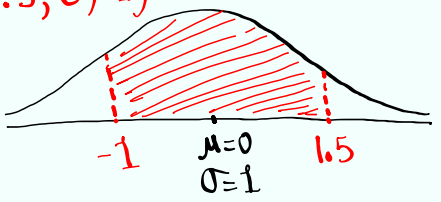
Find $P(-1 < Z < 1.5)$

= normalcdf(−1, 1.5, 0, 1)

(−)



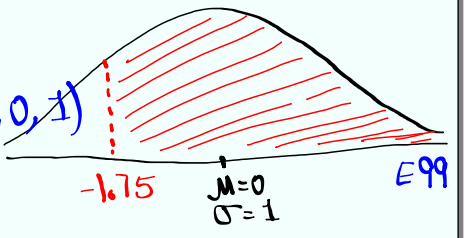
≈ .775

Find $P(Z > -1.75)$

= normalcdf(−1.75, E99, 0, 1)

(−)

2nd [EE]



≈ .960

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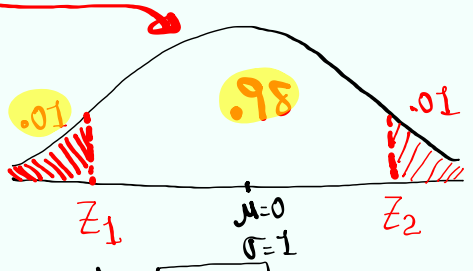
Find two Z-values that separate the middle 98% from the rest. Round to 3-dec. places.

1 − .98 = .02

.02 ÷ 2 = .01



Z_1 = invNorm(.01, 0, 1) ≈ −2.326

Z_2 = invNorm(.99, 0, 1) ≈ 2.326

SG 17 ✓

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Normal Prob. dist.: SG 18

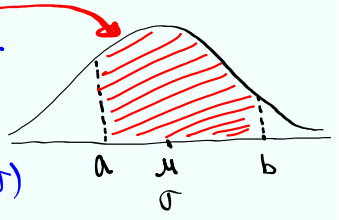
1) Use x, $P(x=c)=0$

2) Dist. is symmetric, bell-shape with total area = 1.

3) Mean = Mode = Median

4) μ & σ are given in the problem.

$P(a<x<b)$ is the corresponding area within the graph.



How to find it:

normalcdf(L, U, μ, σ)

Normal → $N(\mu, \sigma)$ ← Stand. Dev.

Mean

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Given $N(82, 8)$

Normal Prob. Dist.

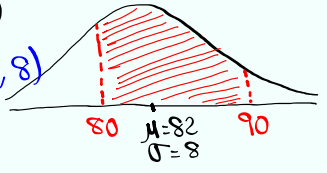
σ

μ

Find $P(80<x<90)$

= normalcdf(80, 90, 82, 8)

$\approx$ .440

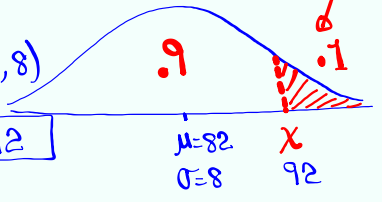


Find a value that separates the top 10% from the rest. Round to whole #.

1 − .1 = .9

x = invNorm(.9, 82, 8)

= 92.252 $\approx$ 92



Apr 22-2:42 PM

Consider a normal Prob. dist. with the mean of 120 and standard dev. of 15.

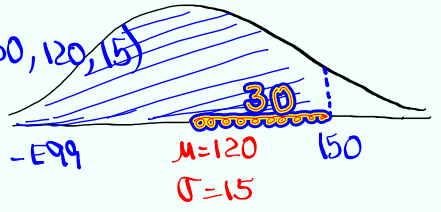
$N(120, 15)$

1) $P(x < 150)$

= normalcdf(−E99, 150, 120, 15)

(−) 2nd [ ]

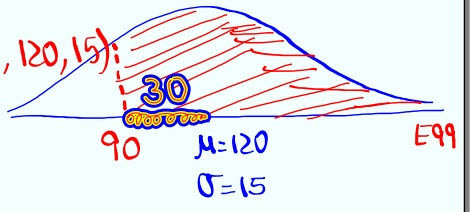
= .977 ✓



2) $P(x > 90)$

= normalcdf(90, E99, 120, 15)

≈ .977 ✓



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Find two x-values that separate the **middle 80%** from the rest. Round to whole #.

$1 - .8 = .2$

$.2 \div 2 = .1$

$x_1 = \text{invNorm}(.1, 120, 15)$ $x_1 = 101$ $\mu = 120$ $\sigma = 15$ $x_2 = 139$

$\approx 100.777 =$ 101

$x_2 = \text{invNorm}(.9, 120, 15) \approx 139.223 \approx$ 139

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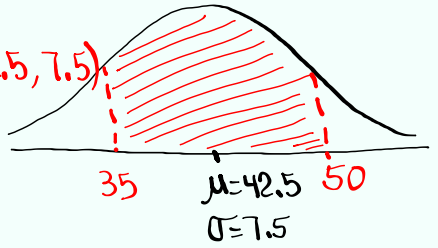
Ages of nurses in LA County are normally dist. with mean of 42.5 yrs and standard dev. of 7.5 yrs. $N(42.5, 7.5)$

If we randomly Select one nurse, find the prob. that his/her age (x) is between 35 and 50 yrs.

$P(35 < x < 50)$

= normalcdf(35, 50, 42.5, 7.5)

$\approx .682$



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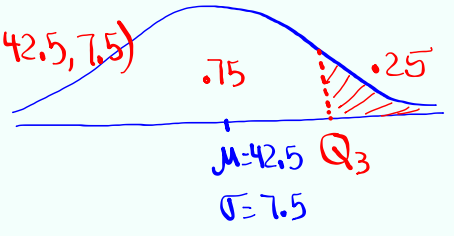
Find $x = Q_3$, Round to 1-dec.

75% below, 25% above

$x = Q_3 = \text{invNorm}(.75, 42.5, 7.5)$

= 47.559

≈ 47.6



75% of nurses are below 47.6 yrs.

25% " " " above " ".

SG 18 ✓

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SG 19

Clear all lists

Store 2, 4, and 6 in L1.

use 1-Var Stats with L1 only to find

$\mu = \bar{x} = 4$ $\quad \sigma = \sigma_x = 1.633$ $\quad \sigma^2 = \frac{8}{3}$

Let's take all Samples of Size 2 with replacement from this list. Find $\bar{x}$ of each Sample

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

2	3	4
3	4	5
4	5	6

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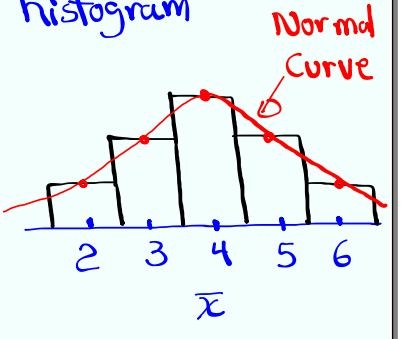
2	3	4
3	4	5
4	5	6

9 means

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

Draw Prob. dist. histogram



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

use 1-Var Stats with L2 & L3

L2: list; L3: FreqList.

$\mu = 4$ $\quad \sigma = 1.155$ $\quad \sigma^2 = \frac{4}{3}$

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Clear all lists.

Store the population of 2, 4, 6, and 8 in L1

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

$\mu = 5$ $\sigma = 2.236$ $\sigma^2 = 5$

Take all Samples of Size 2 with replacement from this Population.

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

Find $\bar{x}$ of each Sample

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

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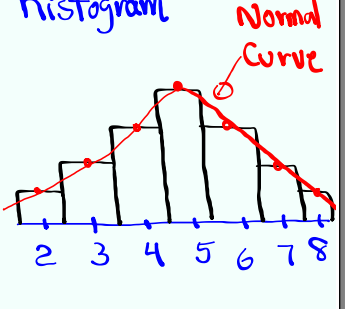
2	3	4	5
3	4	5	6
4	5	6	7
5	6	7	8

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

Draw Prob. dist. histogram



$\bar{x} \rightarrow$ L2, $P(\bar{x}) \rightarrow$ L3, Use [1-Var Stats] with L2 & L3 to find

L2 ↑ List L3 ↑ Freqlist.

$\mu = 5$ $\sigma = 1.581$ $\sigma^2 = 2.5 = \frac{5}{2}$

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For Monday, Repeat Same process for population 2, 4, 6, 8, and 10.

Find μ, σ, and σ^2.

take all Samples of Size 2,

Make the table for

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

$\bar{x} \rightarrow L2$, $P(\bar{x}) \rightarrow L3$ use [1-Var Stats] with L2 & L3 to find μ, σ, and σ^2.

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Pay me \$5, Select a number from 1 to 100. then we draw a number from 1 to 100. If your selection is the Same as the number drawn, I give you \$100. otherwise nothing. Find Expected Value Per play for me.

net	P(Net)	
5 − 100	1/100	Same
5 − 0	99/100	Same

net → L1

P(Net) → L2

[1-Var Stats] with L1 & L2

E.V. = $\mu = \bar{x}$

[\$4]

$\sigma^2 = 99$

Apr 22-4:00 PM