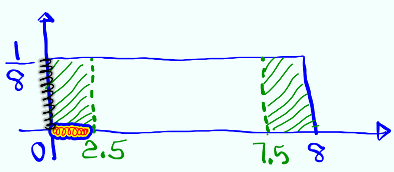
Statistics

Lecture 17

Feb 19-8:47 AM

Suppose the wait time at a local bank to get to a teller has a $\boxed{\text{uniform Prob. dist}}$ with maximum wait time of 8 minutes. ↳ Rectangular

$0 \le x < 8$



1) What is the prob. that wait time is less than 2.5 minutes?

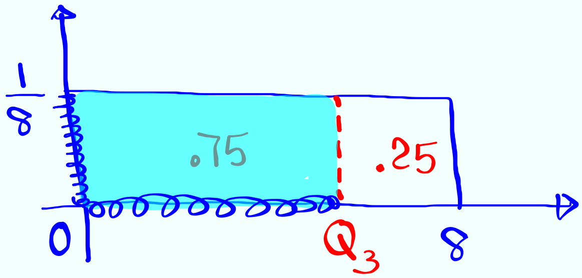
$$P(x < 2.5) = (2.5 - 0) \cdot \frac{1}{8} = \frac{2.5}{8} = \boxed{\frac{5}{16}}$$

2) What is the Prob. that the wait time exceeds 7.5 minutes?

$$P(x > 7.5) = (8 - 7.5) \cdot \frac{1}{8} = \frac{.5}{8} = \boxed{\frac{1}{16}}$$

Apr 21-1:50 PM

3) find Q_3 of wait time, Round to whole minute.



$(Q_3 - 0) \cdot \frac{1}{8} = .75$

$Q_3 \cdot \frac{1}{8} = .75 \rightarrow Q_3 = 8(.75)$

$\boxed{Q_3 = 6}$

6 minutes

Apr 21-1:57 PM

N(0, 1)

Normal Prob. Dist.

$\mu = 0$ $\sigma = 1$

Standard Normal Prob. dist.

use Z

$P(-1.2 < Z < 1.8)$

$\boxed{\text{2nd}}$

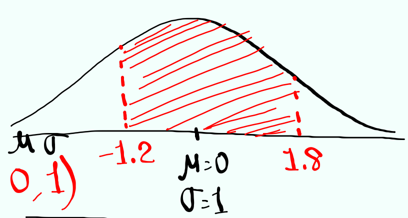
$\boxed{\text{VARS}}$

L U

normalcdf(-1.2, 1.8, 0, 1)

(-)

$= \boxed{.849}$



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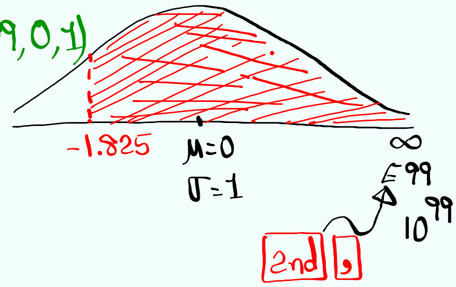
$P(z > -1.825)$

$= \text{normalcdf}(-1.825, E99, 0, 1)$

$= \boxed{.966}$

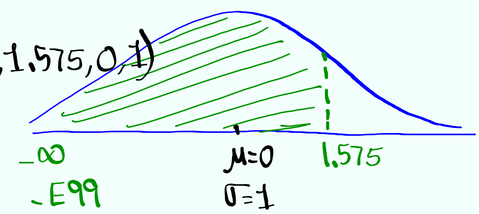


$P(z < 1.575)$

$= \text{normalcdf}(-E99, 1.575, 0, 1)$

(-)

2nd 9



$= \boxed{.942}$

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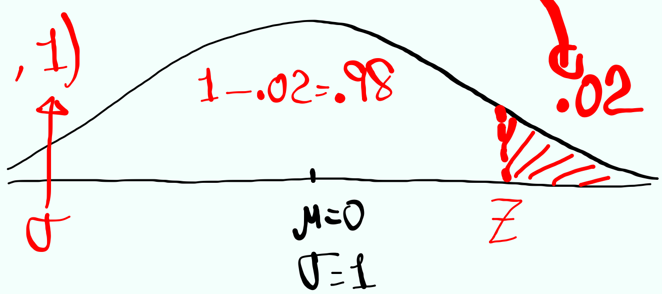
Find a Z-Value, Round to 3-decimal places, that separates the $\boxed{\text{top } 2\%}$ from the rest.

$Z = \text{invNorm}(.98, 0, 1)$

left area μ σ



$= \boxed{2.054}$

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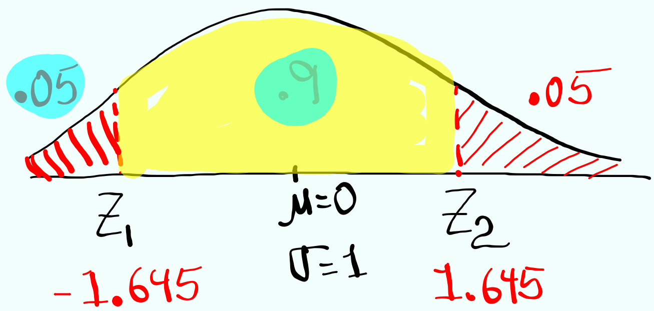
Find two Z-Values, round to 3-decimal places, that separates the middle 90% from the rest.

$1 - .9 = .1$

$.1 \div 2 = .05$



$Z_2 = P_{95} = \text{invNorm}(.95, 0, 1) = \boxed{1.645}$

$Z_1 = P_5 = \text{invNorm}(.05, 0, 1) = \boxed{-1.645}$

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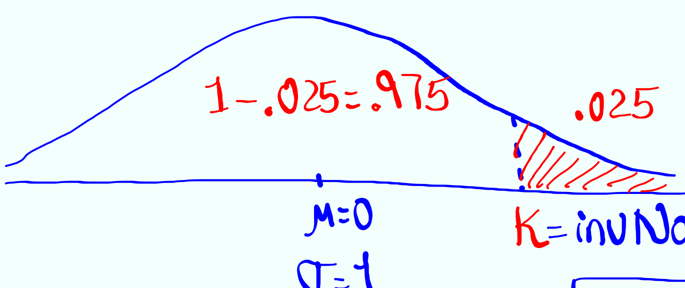
Find K Such that $P(Z > K) = .025$

Right Area



$K = \text{invNorm}(.975, 0, 1)$

$= \boxed{1.960}$

SG 17 ✓

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Normal Prob. Dist.

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

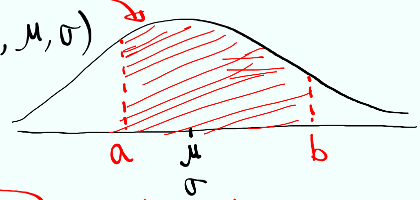
2) Graph is bell-Shape, Symmetric, total area 1

3) Mean, Mode, Median are equal.

4) Mean μ, Standard deviation σ are given in the Problem.

5) $\boxed{P(a<x<b)}$ is the Corresponding area within the bell-Curve.

normalcdf(L, U, μ, σ)



$N(\mu, \sigma)$

Normal Mean Standard Deviation

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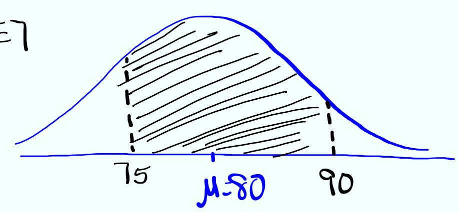
$N(80, 7)$

Normal Prob. Dist. $\mu=80$ $\sigma=7$



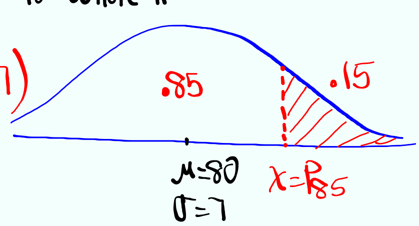
$P(75<x<90)$

$=\text{normalcdf}(75, 90, 80, 7) = \boxed{.686}$

Find $x = P_{85}$, Round to whole #

$x = \text{invNorm}(.85, 80, 7)$

$= 87.255 \approx \boxed{87}$



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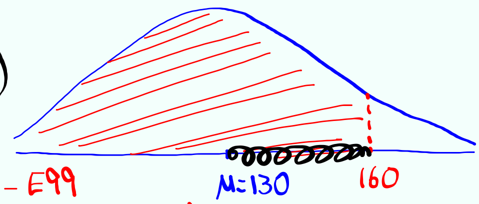
Consider a normal prob. dist. with $\mu = 130$ & $\sigma = 15$.

Find $P(x < 160)$



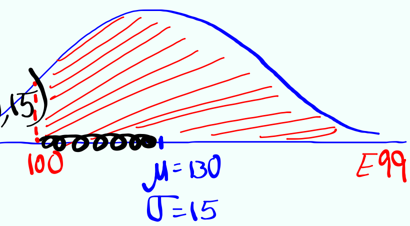
$= \text{normalcdf}(-E99, 160, 130, 15)$ $\sigma = 15$

(–) 2nd ,

$= \boxed{.977}$

$P(x > 100)$

$= \text{normalcdf}(100, E99, 130, 15)$



$= \boxed{.977}$

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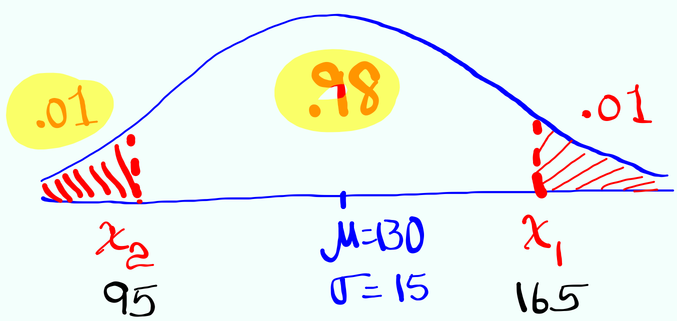
Find two x-values, Round to whole #, such that they separate the $\boxed{\text{middle } 98\%}$ from the rest.

$1 - .98 = .02$

$.02 \div 2 = .01$



$x_1 = \text{invNorm}(.99, 130, 15) = 164.895 \approx \boxed{165}$

$x_2 = \text{invNorm}(.01, 130, 15) \approx \boxed{95}$

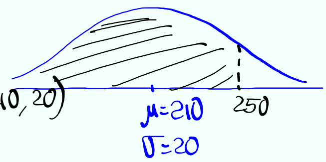
Apr 21-2:51 PM

Total points scored in basketball games are normally dist. with $\mu = 210$ and $\sigma = 20$. $N(210, 20)$

If we randomly select one game, find the prob. that the total points is

a) below 250 pts.

$P(x < 250)$

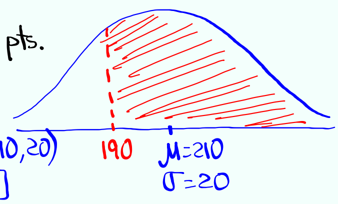


=normalcdf(−E99, 250, 210, 20)

$= \boxed{.977}$

b) more than 190 pts.

$P(x > 190)$



=normalcdf(190, E99, 210, 20)

$= \boxed{.841}$

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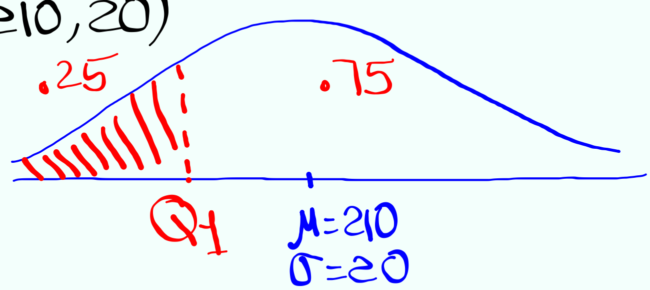
Find $\boxed{Q_1}$ for total points scored in a randomly selected game. Round to whole #.

Q_1 = invNorm(.25, 210, 20)

$= 196.510$

$\approx \boxed{197}$



SG 18 ✓

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Clear all lists.

Store 1, 3, 5 in L1.

Use 1-Var Stats with L1, Find

$\mu = 3$ $\sigma = 1.633$ $\sigma^2 = \frac{8}{3}$

Take all Samples of Size 2 with replacement

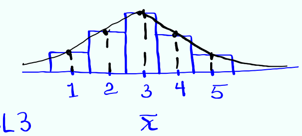
1,1	1,3	1,5
3,1	3,3	3,5
5,1	5,3	5,5

Find $\bar{x}$ of each Sample

1	2	3
2	3	4
3	4	5

9 means

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



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

Use 1-Var Stats with L2 & L3

L2: list
L3: Freq List

$\mu = 3$

$\sigma = 1.155$

$\sigma^2 = \frac{4}{3}$

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Clear all lists

Store 1, 3, 5, 7 in L1.

Use 1-Var Stats with L1 to Find

$\mu = 4$ $\sigma = 2.236$ $\sigma^2 = 5$

Take all Samples of Size 2 with replacement

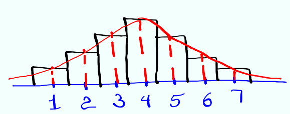
1,1	1,3	1,5	1,7
3,1	3,3	3,5	3,7
5,1	5,3	5,5	5,7
7,1	7,3	7,5	7,7

Find $\bar{x}$ of each Sample

1	2	3	4
2	3	4	5
3	4	5	6
4	5	6	7

16 means

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



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

Use 1-Var Stats with L2 & L3

L2: List
L3: Freq List

$\mu = 4$

$\sigma = 1.581$

$\sigma^2 = \frac{5}{2}$

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