Statistics

Spring 2023

Lecture 33

Feb 19-8:47 AM

Consider a geometric Prob. dist. with $p = .2$

1) $q = 1 - p = \boxed{.8}$ ✓ 2) $\mu = \frac{1}{p} = \frac{1}{.2} = \boxed{5}$ ✓ 3) $\sigma^2 = \frac{q}{p^2} = \frac{.8}{.2^2} = \boxed{20}$ ✓

4) $\sigma = \sqrt{\sigma^2} = \sqrt{20} \approx \boxed{4.5}$ ✓

5) usual Range $\Rightarrow \mu \pm 2\sigma = 5 \pm 2(4.5) = 5 \pm 9 \Rightarrow \boxed{-4 \text{ to } 14}$ ✓

6) $P(x = 5) = \text{geometpdf}(.2, 5) = \boxed{.082}$

7) $P(x < 5) = P(x \leq 4) = \text{geometcdf}(.2, 4) = \boxed{.590}$

8) $P(x > 5) = P(x \geq 6) = 1 - P(x \leq 5)$

$= 1 - \text{geometcdf}(.2, 5)$

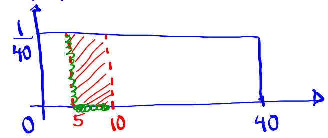
5 6

$= \boxed{.328}$

Apr 12-7:21 AM

wait time by red light has a uniform prob. dist for up to 40 Seconds.

1) Draw & clearly label.



2) P(wait time is $\boxed{\text{exactly 20}}$ Seconds)

$P(x=20)=\boxed{0}$

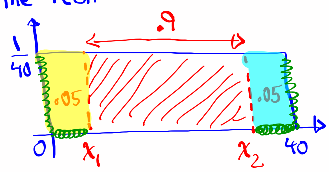
3) P(wait time is $\boxed{\text{between 5 to 10}}$ Seconds)

$P(5<x<10)=(10-5)\cdot\frac{1}{40}=\frac{5}{40}=\boxed{\frac{1}{8}}=\boxed{.125}$

4) Find two wait times that separate the $\boxed{\text{middle 90\%}}$ from the rest.

$1-.9=.1$

$.1\div 2=.05$



$(x_1-0)\cdot\frac{1}{40}=.05$

$x_1-0=40(.05)$

$\boxed{x_1=2}$

$(40-x_2)\cdot\frac{1}{40}=.05$

$40-x_2=40(.05)$ $\boxed{x_2=38}$

Apr 13-7:20 AM

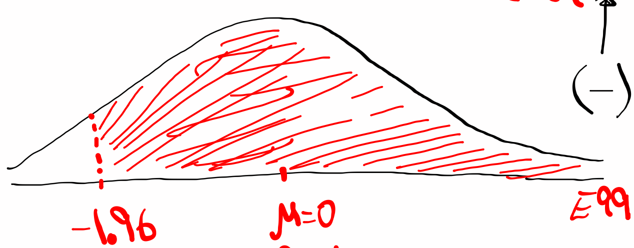
Find $P(Z>-1.96)$

L U μ σ

$=\text{normalcdf}(-1.96, E99, 0, 1)$

(–) 2nd 9 7

$=\boxed{.975}$

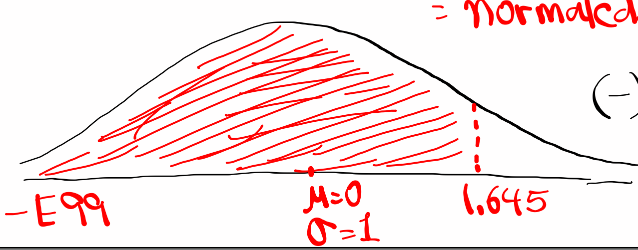


Find $P(Z<1.645)$

$=\text{normalcdf}(-E99, 1.645, 0, 1)$

(–) 2nd 9 7

$=\boxed{.950}$

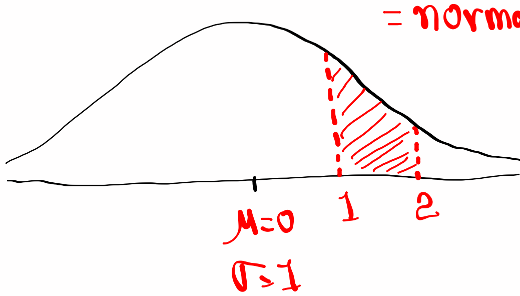


Apr 13-7:29 AM

Find $P(1 < Z < 2)$

$= \text{normalcdf}(1, 2, 0, 1)$

$= \boxed{.136}$



Apr 13-7:36 AM

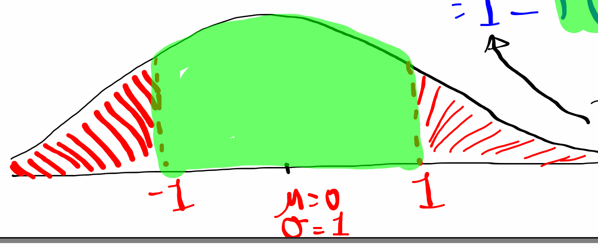
Find $P(Z < -1 \text{ or } Z > 1)$

$= 1 - P(-1 < Z < 1)$

Total Area

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

$= \boxed{.317}$



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

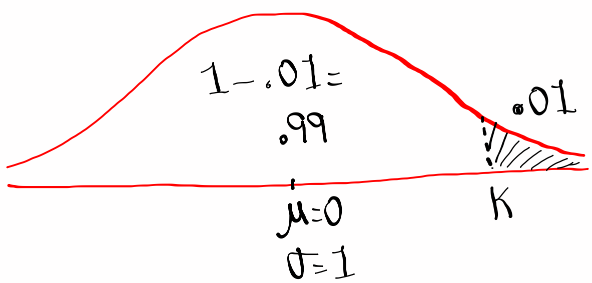
Right Area

left Area

μ σ

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

$= \boxed{2.326}$

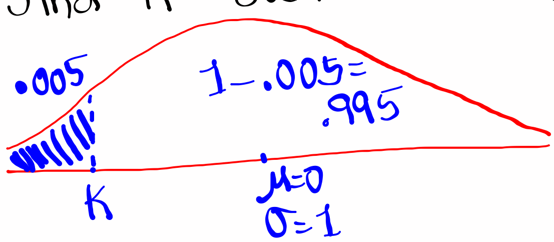


Find K such that $P(Z < K) = .005$

Left Area

$K = \text{invNorm}(.005, 0, 1)$

$= \boxed{-2.576}$



Apr 13-7:42 AM

Normal Prob. dist.:

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

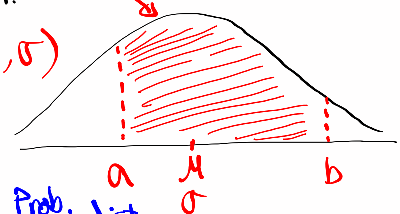
2) Graph is bell-Shape, Symmetric with total area 1.

3) Mean = mode = Median

4) μ & σ are given in the problem.

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

normalcdf(a, b, μ, σ)



$N(\mu, \sigma)$

Normal Prob. dist.

Apr 13-7:47 AM

Given $N(75, 10)$

Normal

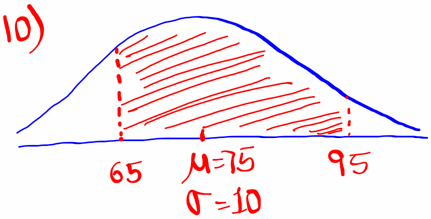
μ

σ

1) Find $P(65<x<95)$

$=$ normalcdf$(65, 95, 75, 10)$

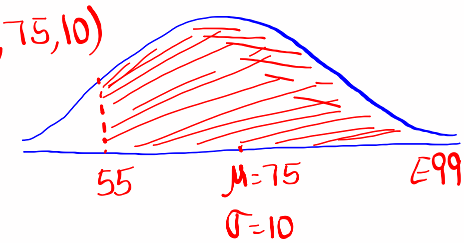
$= \boxed{.819}$



2) Find $P(x>55)$

$=$ normalcdf$(55, E99, 75, 10)$

$= \boxed{.977}$



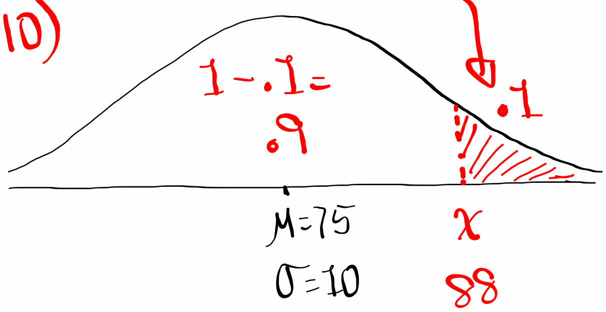
Apr 13-7:52 AM

3) Find x, round to a whole #, that separates the top 10% from the rest.

$x = \text{invNorm}(.9, 75, 10)$

$= 87.816$

≈ 88



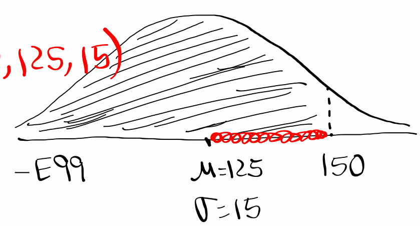
Apr 13-7:57 AM

Consider a normal Prob. dist with the mean of 125 and Standard deviation 15. $N(125, 15)$

1) Find $P(x < 150)$

$= \text{normalcdf}(-E99, 150, 125, 15)$

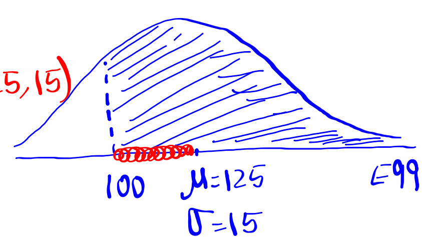
$= \boxed{.952}$



2) Find $P(x > 100)$

$= \text{normalcdf}(100, E99, 125, 15)$

$= \boxed{.952}$



Apr 13-8:01 AM

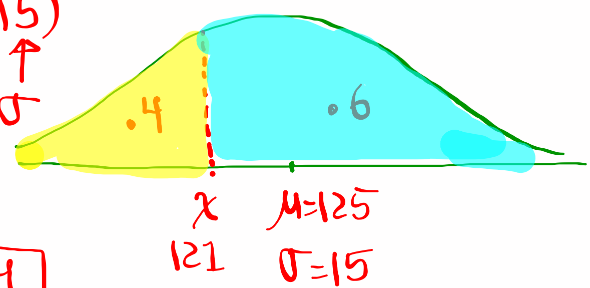
3) Find $x = P_{40}$, Round to a whole #.

40% below (Left Area = .4)

60% above (Right area = .6)

$x = \text{invNorm}(.4, 125, 15)$

left Area, μ, σ



$= 121.200 \approx \boxed{121}$

121.1997

Apr 13-8:08 AM

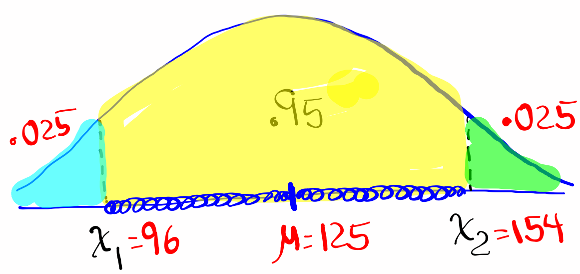
4) Find two x-values, round to whole #, such that they separate the middle 95% from the rest.

$1 - .95 = .05$

$.05 \div 2 = .025$

$125 - 96 = 29$

$154 - 125 = 29$



$\sigma = 15$

$x_1 = \text{invNorm}(.025, 125, 15) = 95.600 \approx \boxed{96}$

$x_2 = \text{invNorm}(.975, 125, 15) = 154.399 \approx \boxed{154}$

Apr 13-8:13 AM

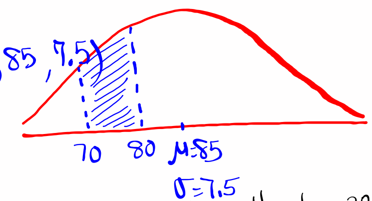
Exam Scores are normally dist. with $\mu=85$ and $\sigma=7.5$. $N(85, 7.5)$

If $\underbrace{\text{one exam}}_{x}$ is randomly selected, find the prob. that it is between 70 & 80.

$P(70<x<80)$

$=\text{normalcdf}(70,80,85,7.5)$

$=\boxed{.230}$



Find exam Score that separates the top 20% from the rest.

$x=\text{invNorm}(.8,85,7.5)$

$=91.312$

$\approx\boxed{91}$

SG 18
SG 19 ✓