Statistics
Spring 2023
Lecture 32

Feb 19-8:47 AM

Class QZ 9:

Consider a binomial Prob. dist. with $n=50$ and $p=.8$.

Let x be # of successes,

1) $P(x=45) = \text{binompdf}(50, .8, 45) = \boxed{.030}$

2) $P(x \le 45) = \text{binomcdf}(50, .8, 45) = \boxed{.982}$

3) $P(x \ge 40) = 1 - P(x \le 39) = 1 - \text{binomcdf}(50, .8, 39) = \boxed{.584}$

39 40

$\mu = np = 50(.8) = \boxed{40}$

$\sigma^2 = npq = 50(.8)(.2) = \boxed{8}$

$\sigma = \sqrt{\sigma^2} = \sqrt{8} \approx \boxed{3}$

Apr 11-8:16 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) $\sigma^2 = \frac{q}{p^2} = \frac{.8}{.2^2} = \boxed{20}$

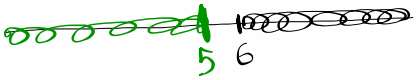
4) $\sigma = \sqrt{\sigma^2} = \sqrt{20} \approx \boxed{4.5}$

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

6) $P(x = 5) = \text{geometpdf}(.8, 5) = \boxed{.001}$

7) $P(x < 5) = P(x \leq 4) = \text{geometcdf}(.8, 4) = \boxed{.998}$

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



$= 1 - \text{geometcdf}(.8, 5)$

$= \boxed{3.2 \times 10^{-4}}$

Apr 12-7:21 AM

Consider a poisson Prob. dist. with $\mu = 9$ in a fixed interval.

1) $\sigma^2 = \mu = \boxed{9}$

2) $\sigma = \sqrt{\sigma^2} = \sqrt{9} = \boxed{3}$

3) 68% Range

$\mu \pm \sigma = 9 \pm 3 \Rightarrow \boxed{6 \text{ to } 12}$

4) 95% Range

Usual Range

$\mu \pm 2\sigma \Rightarrow \boxed{3 \text{ to } 15}$

5) $P(x = 10) = \text{Poisson Pdf}(9, 10) = \boxed{.119}$

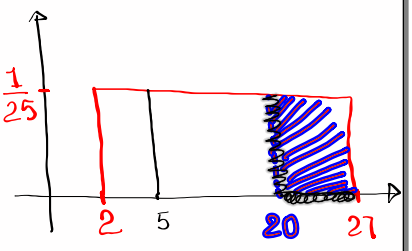
($\lambda = \mu$)

6) $P(x \geq 8) = 1 - P(x \leq 7) = 1 - \text{Poissoncdf}(9, 7) = \boxed{.676}$

Apr 12-7:30 AM

Consider a **Uniform Prob. dist.** for all values from **2 to 27**.

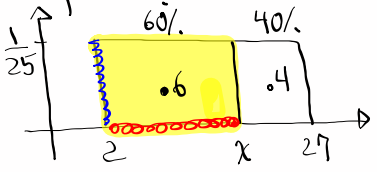
1) Draw & label clearly.



2) $P(x=5) = \boxed{0}$

3) $P(x>20) = (27-20)\cdot\frac{1}{25} = \boxed{\frac{7}{25}} = \boxed{.28}$

4) Find a value, rounded to a whole #, that separates the **bottom 60%** from the rest.



$(x-2)\cdot\frac{1}{25} = .6$

$x-2 = 25(.6)$

$x = 2+25(.6)$ $\boxed{x=17}$

Apr 12-7:36 AM

Standard Normal Prob. Dist.

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

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

3) Mean = Mode = Median

4) $\mu=0$, $\sigma=1$

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

2nd VARS

normalcdf(

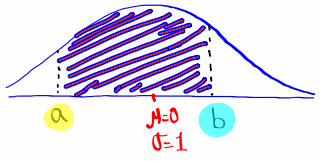
Lower: a

Upper: b

$\mu=0$

$\sigma=1$

Paste Enter



If no menu

normalcdf(L, U, 0, 1)

Drawing, labeling, shading, full TI command required

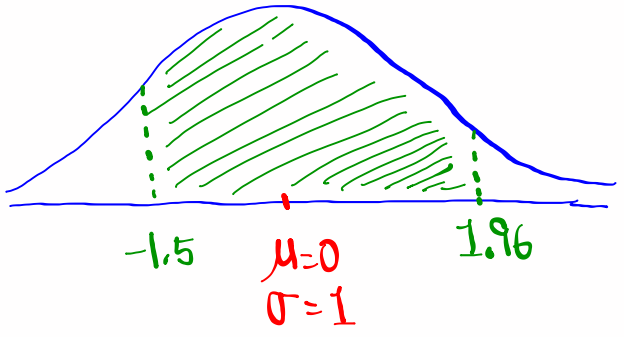
Apr 12-7:47 AM

Find $P(-1.5 < Z < 1.96)$

= normalcdf(−1.5, 1.96, 0, 1)

(−) [7]

= .908

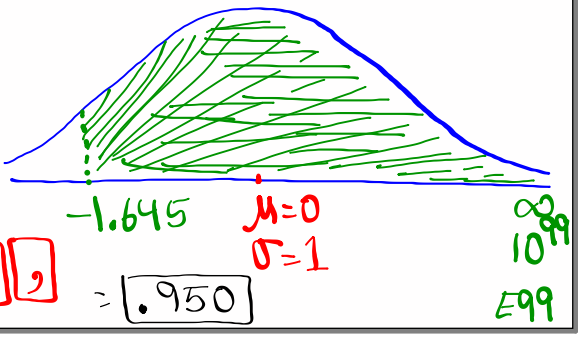


$P(Z > -1.645)$

= normalcdf(−1.645, E99, 0, 1)

(−) [7] [2nd] [,]

= .950



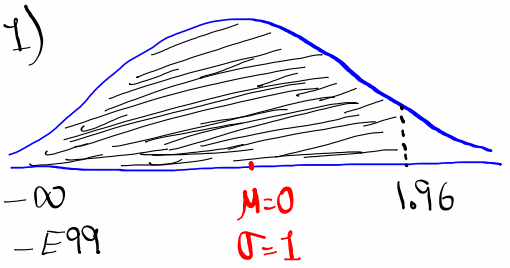
Apr 12-7:53 AM

$P(Z < 1.96)$

= normalcdf(−E99, 1.96, 0, 1)

(−) [7] [2nd] [,]

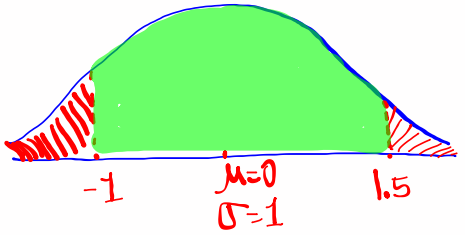
= .975



$P(Z < -1 \text{ OR } Z > 1.5)$

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

↑ Total Area



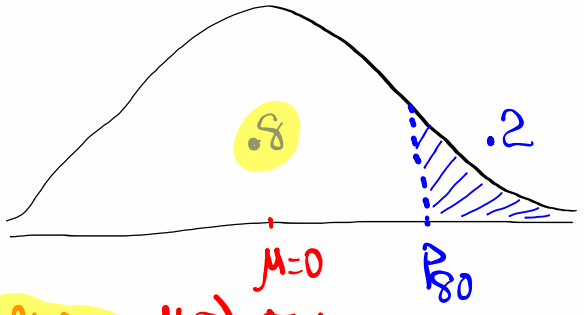
= 1 − normalcdf(−1, 1.5, 0, 1) = .225

Apr 12-8:00 AM

Find $z = P_{80}$, round to 3-decimal places

80% below
20% above

2nd VARS



$z = P_{80}$ = invNorm(Left Area, μ, σ) σ=1

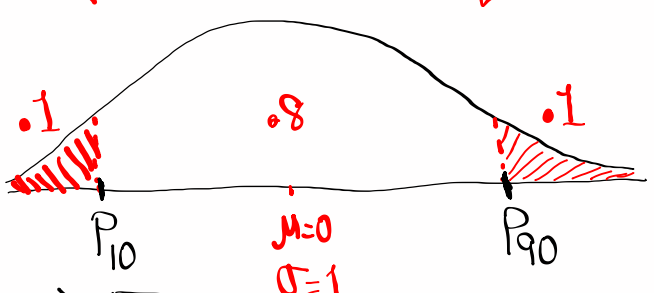
= invNorm(.8, 0, 1) = .842

Apr 12-8:07 AM

Find two z-values, round to 3-decimal places, that separate the middle 80% from the rest.

1 − .8 = .2

.2 ÷ 2 = .1



P_{10} = invNorm(.1, 0, 1) = −1.282

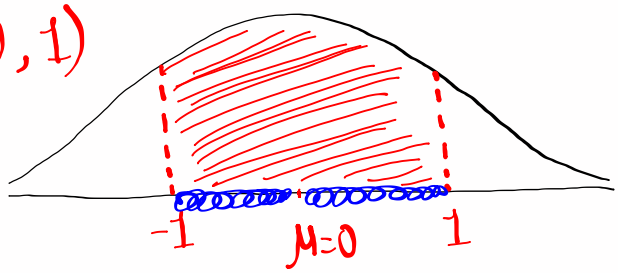
P_{90} = invNorm(.9, 0, 1) = 1.282

Apr 12-8:11 AM

$P(-1 < Z < 1)$

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

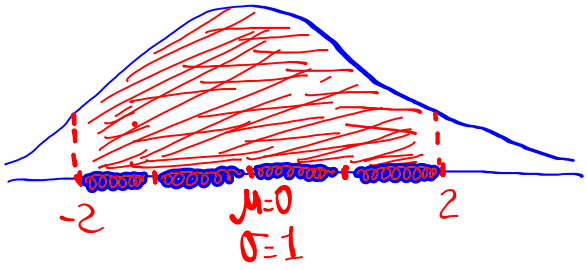
$= .683 \approx 68\%$



$P(-2 < Z < 2)$

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

$= \boxed{.954} \approx 95\%$

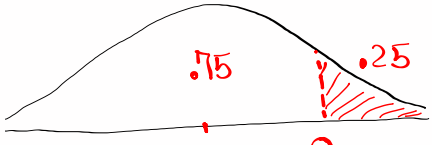


Apr 12-8:18 AM

Find $Z = Q_3$

75% below

25% above



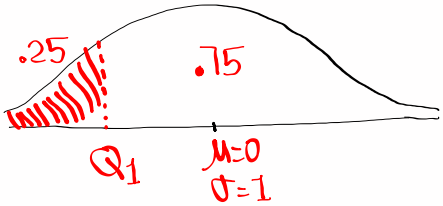
$Z = Q_3 = \text{invNorm}(\text{Left Area}, \mu, \sigma) = \text{invNorm}(.75, 0, 1)$

$= \boxed{.674}$

Find $Z = Q_1$

25% below

75% above



$Z = Q_1 = \text{invNorm}(.25, 0, 1) = \boxed{-.674}$

Apr 12-8:24 AM