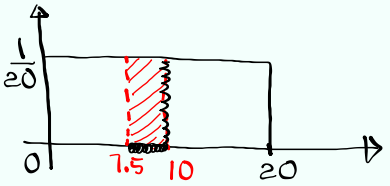
Statistics

Lecture 39

Feb 19-8:47 AM

The city bus comes around every 20 minutes. The wait time for anyone at bus stop has a uniform prob. dist.

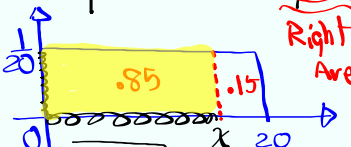


What is the prob. that your wait time is between 7.5 and 10 minutes?

$P(7.5<x<10) = (10-7.5)\cdot\frac{1}{20} = 2.5\cdot\frac{1}{20} = \frac{5}{2}\cdot\frac{1}{20} = \boxed{\frac{1}{8}}$

Find the wait time that separates the top 15% from the rest

Right Area



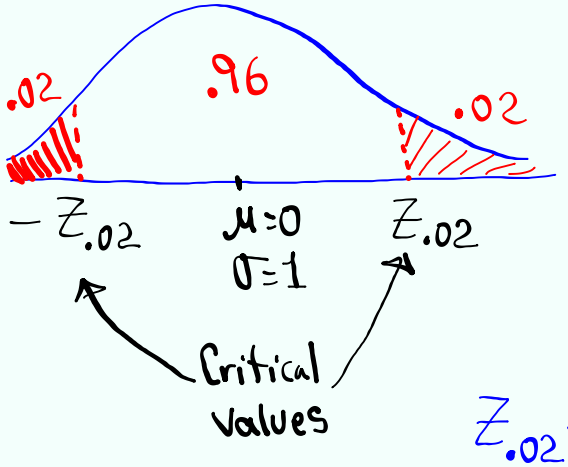
$(x-0)\cdot\frac{1}{20} = .85$

$x - 0 = 20(.85)$

$\boxed{x=17}$

Nov 7-8:48 AM

Find $\pm z_{\alpha/2}$ for 96% Conf. Interval.



Middle Area .96

$1-\alpha=.96$

$\alpha=.04$

$\frac{\alpha}{2}=.02$ ← Area of each tail

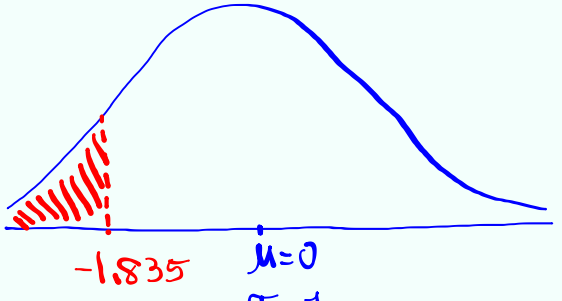
$z_{.02}=\text{invNorm}(.98,0,1)$

$=\boxed{2.054}$

Nov 7-8:55 AM

Find **twice** the **area to the left** of

$z=-1.835$.



2 • normalcdf(-E99, -1.835, 0, 1)

$=\boxed{.067}$

Nov 7-8:59 AM

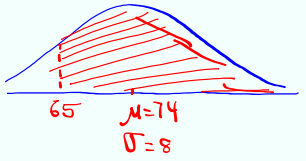
Suppose temp. in LA has a normal dist. with mean of 74° and standard dev. of 8°.

If we randomly select 1 day, find the Prob. that temp (x) is above 65°.

$P(x > 65)$

= normalcdf(65, E99, 74, 8)

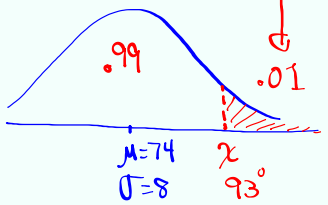
= .870



Find the temp. that separates the top 1% from the rest.

x = invNorm(.99, 74, 8)

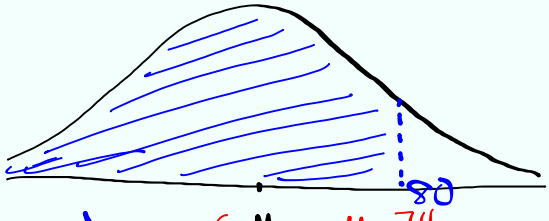
≈ 93°



Nov 7-9:03 AM

If we randomly select 5 days ($n = 5$) find the Prob. that the mean temp ($\bar{x}$) is below 80°

$P(\bar{x} < 80)$



= normalcdf(-E99, 80, 74, 8/√5)

= .953

CLT $\mu_{\bar{x}} = \mu = 74$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{8}{\sqrt{5}}$

Nov 7-9:11 AM

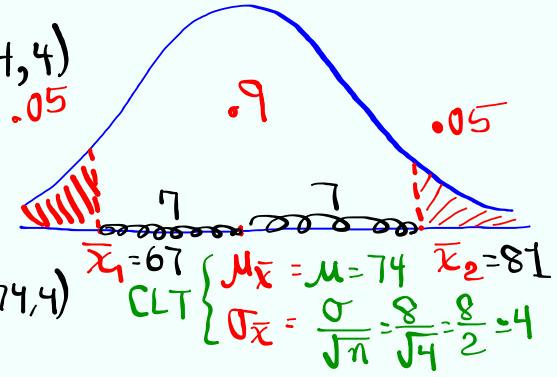
For randomly selected $n = 4$ days find two mean temp $\bar{x}$ that separate the middle 90% from the rest.

$\bar{x}_1 = P_5 = \text{invNorm}(.05, 74, 4)$

$= 67$

$\bar{x}_2 = P_{95} = \text{invNorm}(.95, 74, 4)$

$= 81$



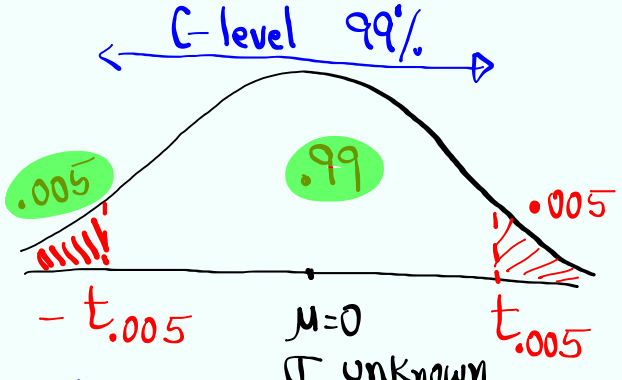
Nov 7-9:16 AM

Find $\pm t_{\alpha/2}$ for $\alpha = .01$ with $df = 19$.

$\alpha = .01$

$1 - \alpha = .99$

$\frac{\alpha}{2} = .005$

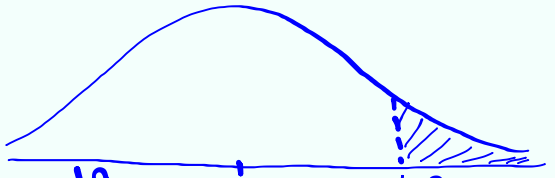


$t_{.005} = \text{invT}(.995, 19) = 2.861$ $df = 19$

Nov 7-9:22 AM

Find twice the area to the right of

$t = 1.936$ with $df = 14$.



$2 \cdot tcdf(1.936, E99, 14)$

σ unknown
df = 14

$= .073$

Nov 7-9:26 AM

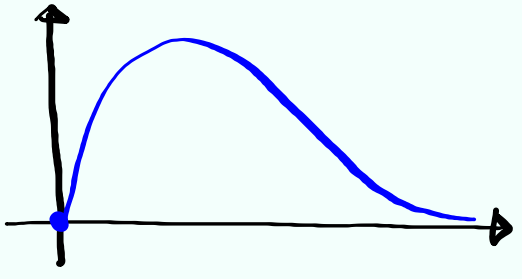
Chi – Square dist.:

χ^2 Dist.

1) Not Symmetric, total Area = 1

2) Starts at 0, and Skewed to the right.

3) It comes with degrees of freedom.



use

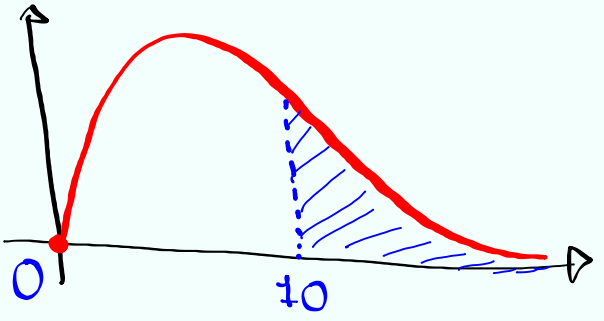
$\chi^2 cdf(L, U, df)$

Nov 7-9:30 AM

Find $P(\chi^2 > 10)$ with $df = 7$.

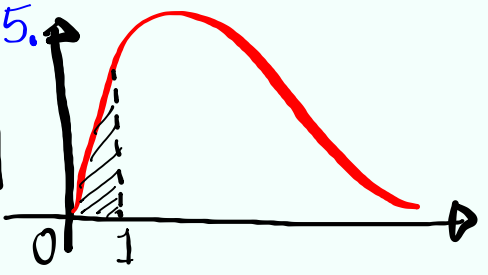
$= \chi^2cdf(10, E99, 7)$

$= \boxed{.189}$



$P(\chi^2 < 1)$ with $df = 5$.

$= \chi^2cdf(0, 1, 5) = \boxed{.037}$

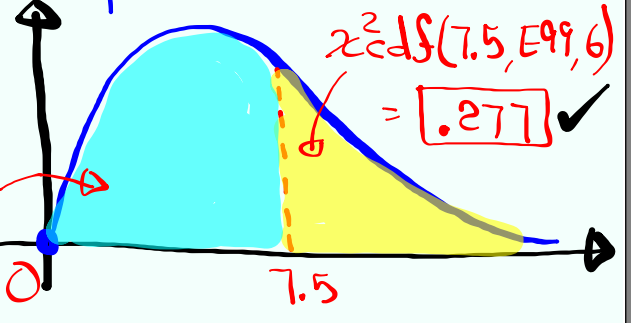


Nov 7-9:34 AM

Find the area of both sides of $\chi^2 = 7.5$ with $df = 6$, multiply the Smaller area by 2.

$\chi^2cdf(0, 7.5, 6) = \boxed{.723}$ ✓

$\chi^2cdf(7.5, E99, 6) = \boxed{.277}$ ✓



$2 \cdot (.277) = \boxed{.554}$

Nov 7-9:38 AM

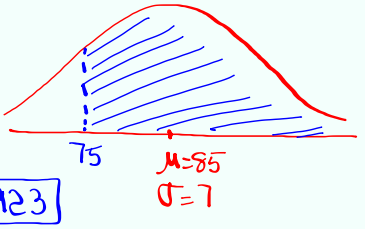
Class QZ 9

Given $N(85, 7)$

1) $P(x > 75)$

= normalcdf(75, E99, 85, 7)

= .923

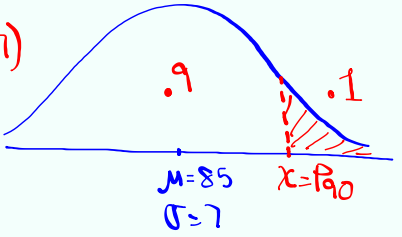


2) Find $x = P_{90}$, Round to whole #.

x = invNorm(.9, 85, 7)

= 93.971

≈ 94



Nov 7-9:43 AM