Statistics

Lecture 32

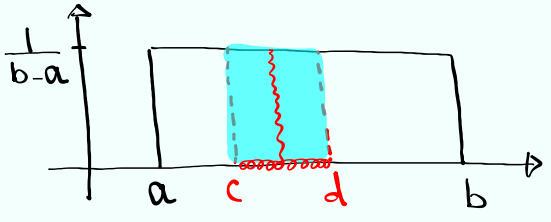
Feb 19-8:47 AM

SG 18

Working Continuous random Variable

Uniform Prob. dist. for $a \le x \le b$.

Graph is rectangular with total area = 1.



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

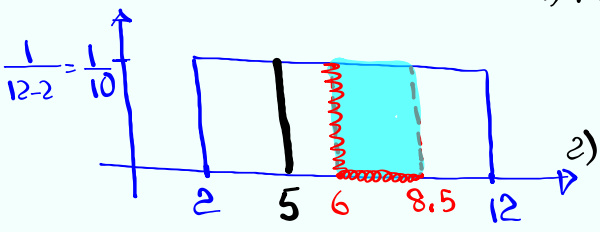
2) $P(c < x < d)$ is the corresponding shaded area.

$P(c < x < d) = (d - c) \cdot \frac{1}{b-a}$

Oct 23-8:49 AM

Consider a Uniform Prob. dist. for all values from 2 to 12.

1) $P(x=5) = \boxed{0}$ ← line (zero Area)



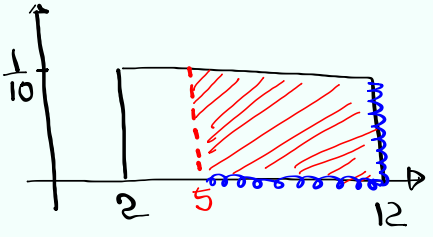
2) $P(6 < x < 8.5)$

$= (8.5-6)\cdot\frac{1}{10}$

$= 2.5 \cdot \frac{1}{10} = \boxed{.25}$

3) $P(x > 5) = (12-5)\cdot\frac{1}{10} = \frac{7}{10}$

$= \boxed{.7}$



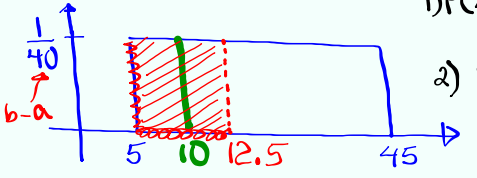
Oct 23-8:55 AM

Consider a uniform Prob. dist. for all values from 5 to 45.

Rectangular Graph

a = 5, b = 45

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



2) $P(x < 12.5)$

$= (12.5-5)\cdot\frac{1}{40}$

$= 7.5 \cdot \frac{1}{40}$

$= \frac{7.5}{40} = \boxed{\frac{3}{16}}$

3) Find $x = P_{90}$

90% below — Left Area .9

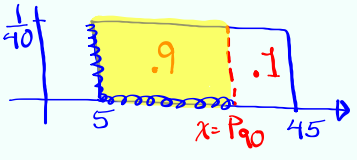
10% above — Right Area .1

$(x-5)\cdot\frac{1}{40} = .9$

$x-5 = 40(.9)$

$x-5 = 36$

$\boxed{x = 41}$

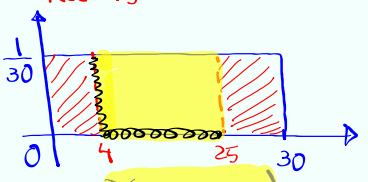


Oct 23-9:01 AM

Consider a uniform Prob. dist. for all values from 0 to 30.

a = 0, b = 30

Rectangular



$P(x<4 \text{ OR } x>25) = 1 - P(4<x<25)$

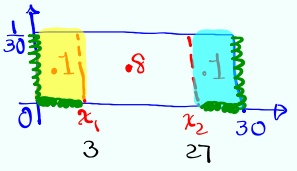
Total Prob.

$= 1 - (25-4)\cdot\frac{1}{30}$

$= 1 - \frac{21}{30} = \frac{9}{30} = \frac{3}{10} = .3$

Find two x-values that separate the middle 80% from the rest.

$1 - .8 = .2, \quad .2 \div 2 = .1$



$(x_1 - 0)\cdot\frac{1}{30} = .1 \quad x_1 = 30(.1) \quad \boxed{x_1 = 3}$

$(30 - x_2)\cdot\frac{1}{30} = .1 \quad 30 - x_2 = 30(.1) \quad 30 - x_2 = 3 \quad \boxed{x_2 = 27}$

Oct 23-9:12 AM

Standard Normal Prob. dist.

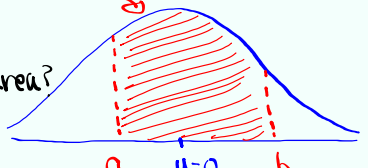
1) Use Z, $P(Z=c) = 0$

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

3) Mean = Mode = Median

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

5) $P(a<Z<b)$ is the area of the corresponding region in the bell-shape graph.



How to find this area?

2nd VARS

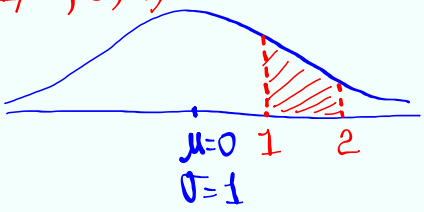
normalcdf(L, U, μ, σ)

Oct 23-9:22 AM

Find $P(1 < z < 2)$

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

$= .136$

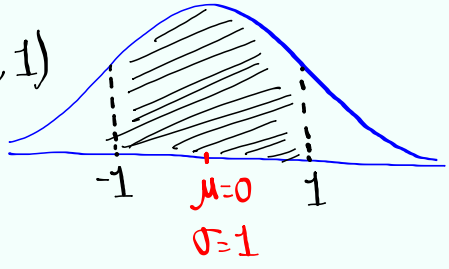


Find $P(-1 < z < 1)$

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

(−)

$= .683 \approx 68\%$



Oct 23-9:29 AM

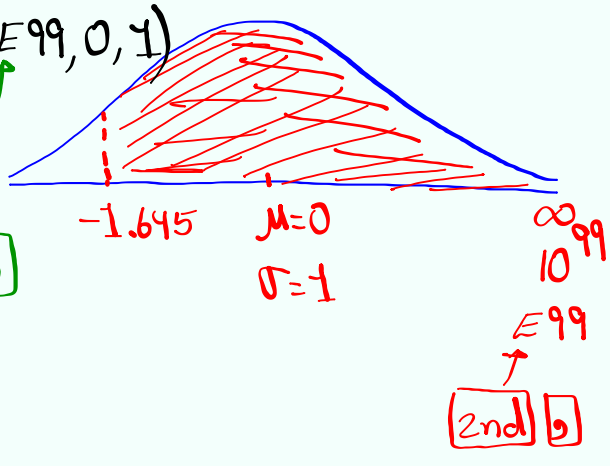
Find $P(z > -1.645)$

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

(−)

2nd [,]

$= .950$



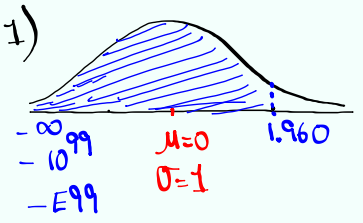
Oct 23-9:36 AM

Find $P(Z < 1.960)$

= normalcdf(−E99, 1.960, 0, 1)

(−) 2nd [9]

= .975



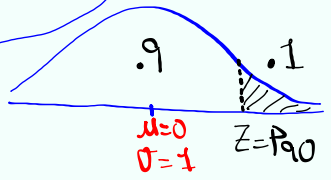
Find $Z = P_{90}$

90% below — .9 Left Area

10% above — .1 Right Area

Z = invNorm(.9, 0, 1) = 1.282

Left Area, μ, σ



Oct 23-9:39 AM

Consider a geometric Prob. dist with $p = .9$

1) P(first Success happens on 5th attempt)

$P(x = 5)$ = geometpdf(.9, 5)

$= 9E{-}5 = \boxed{9 \times 10^{-5}}$

2) P(first Success happens before the 4th attempt)

$P(x < 4) = P(x \leq 3)$ = geometcdf(.9, 3) = .999

Oct 23-9:47 AM

Consider a Poisson Prob dist. with the mean of 18 on a fixed interval.

P(# of successes is not 20)

$= P(X \neq 20) = 1 - P(X = 20)$

$= 1 - \text{Poisson pdf}(18, 20)$

$= \boxed{.920}$

Oct 23-9:53 AM