

## The Probability Distribution of a continuous Rondom Vaciable

It focuses on how probabilities are assigned to interals of continuous values rather than specific values tos instance, it a commuter waits dos a but, the naiting time (ould be any value bothern 0 and 30 minutes, maky of impactical to assign a manifold poolsability to a specific maiting time like exactly 7.211916 minutes

Definition at Probability Distribution

The probability distribution of a continuous sandom voriable X is described using a density function of X The probability that X falls within an interval Equipilis gien by the one a under the curse of f(x) between a

Key properties of Density Sunctions

1) f(x1)≥0 fox all values out x1 (the graph news quest below

the x-9xis).

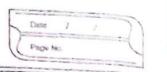
2) Re total area under the cusic is I total Probability).

3) The probability of an exact value is Zero

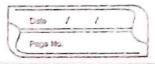
Placx <b = Placx

Example: Haiting Time dor a Bus
. A man acrives sandomly at a bus stop Busar assis any

To noiting the X dollows a unitern distribution entito



	The density dunction is $f(x) = \frac{1}{30}, 0 \le x \le 30$
	$f(x) = 1  0 \leq x \leq 3a$
	30
,	Finding Probability that a Bus arrives in To minutes $P(0 \le X \le 10) = 10 \times 1 - 1/3$
_	P(0 < x < 10) = 10 x 1 - 7/2
	30
	i. The probability that the Bus cores within rext to minutes is 7/3
	minutes is 7/7
<i></i>	
	Normal Distribution (Re Bell (use)
	the hornal distribution described the belaving of
	The state of the s
	Heights at people, product neights in mudacturing
	The donsity function (be) curve) is defined as: $S(x) = \frac{1}{2\pi^2} e^{-(x-2i)^2}$
	$S(x) = \frac{1}{2} e^{-(x-\lambda_1)^2}$
J	V271-2 20°
	whose; I = mean (contex of the cyrus)
	= Standard devication (spread of the (usue)
~	Properties of Nornal Distribution
	Summetric about the mean 21
- 2	) Different values of a determine the slape:
-	shelles o -> Talles and maron is cure
-	langer or -) Storter and wider curve
<u> </u>	I The total one a under the work is 1
~	



Example Height of a 25 year old Men

Heights of 25 year old non follow a rosmal distribution

Mean 21 = 69.75 inches: Standard deviation: 0 = 7.59 inches in class Pourability that a Random Mar is talled ther 69.75 Since the romal curve is symptoic, the probability that De cose Lalis of the total area lies above the man Jumpay
T) Continuous sandom vaxiables do not have probabilities for out values , only soo enterials.

2) The probability distribution is given by a derity sucherous.

3) Unidoson distributions have contant probabilities withing. yorkiables, classificition (bell cursues) doscore many sel-world vorkiables, classification of by their mean (x) and standard deviction (0) Sor a roomal distribution, the total area is I Probability Computations dos Cereral Noona | Random Versables Id X is a normally distributed rendom variable with mean in and standard deviation or the note probability of the doc

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Page N	a.		

## p(q. (X<b) is computed as

P(a<x<b->= P(a-21x = < 6-21)

where Z is the Standard pound variable

- a and be can be any decinal number or extend to - x ds = - ~ 08 ×
  - Re values and 5- 2 are called Zscors
  - · The probability is determined using the standard works) table los cumulative probability clost)

Example: compute P(8 < X < I4):

P(8 < X < 14) = P(8-10 < Z < 14-16)
2.5

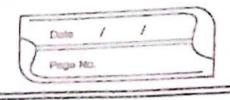
P(-0-80<Z<1.60) = P(Z<1.60)-P(Z(-0)) 4 sing rosmal table = 0.9452 - 0.2129 = 0.7333

Example: Collège Entrance Exam Soures;

· (EE scores follow X~N(570,60)

- · A selective university considers of applicants with scores above 650
- · Find the percentage of test takes noting the unionsty's sequirment.

Solution  $P(X > 650) = P(Z > \frac{650-520}{60}) = P(Z > 2.33)$ 



Using the rowner) table:  $P(Z \ge 7.33) = 0.9901$  P(Z > 7.33) = 1 - 0.9901 = 0.0999Thus, only 0.9970× (a bout 1 %-) of test takes a qualify for admission

1) Cere a 1 resnal probabilities are computed by converting X - 1 also into Z - Ccores: Z = X - 2

2) Die the Standard rosne) table to déand complétie Probabilités
3) SUbtract cumulative probabilities to compute internal
probabilities
4) 600 upper/lonex tuil probabilities, subtract from I.