p.161 ①

11-2

46. Hyper($N=27, S=2, n=3$)

$$p(x) = \frac{\binom{S}{x}\binom{N-S}{n-x}}{\binom{N}{n}} = \frac{\binom{2}{x}\binom{25}{3-x}}{\binom{27}{3}}$$

$$P(X=0) = p(0) = \frac{\binom{2}{0}\binom{25}{3}}{\binom{27}{3}} = .7863$$

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② 47. Hyper($N=14, S=5, n=7$)

$$p(x) = \frac{\binom{5}{x}\binom{9}{7-x}}{\binom{14}{7}}$$

$$P(X \geq 3) = p(3) + p(4) + p(5)$$

$$= \frac{\binom{5}{3}\binom{9}{4}}{\binom{14}{7}} + \frac{\binom{5}{4}\binom{9}{3}}{\binom{14}{7}} + \frac{\binom{5}{5}\binom{9}{2}}{\binom{14}{7}}$$

$$= .3671 + .1224 + .0105 = .5$$

48. $Pois(\mu = .71)$ (3)

$$p(x) = \frac{\mu^x e^{-\mu}}{x!} = \frac{(.71)^x e^{-.71}}{x!}$$

a) $P(X \geq 2) = 1 - P(X < 2)$

$= 1 - [p(0) + p(1)]$

$= 1 - \left[\frac{(.71)^0 e^{-.71}}{0!} + \frac{(.71)^1 e^{-.71}}{1!}\right]$

$= 1 - [.4916 + .3491]$

$= .1593$

b) $P(X=0) = p(0) = .4916$

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49. $Pois(\mu = 2.83)$ (4)

$$p(x) = \frac{2.83^x e^{-2.83}}{x!}$$

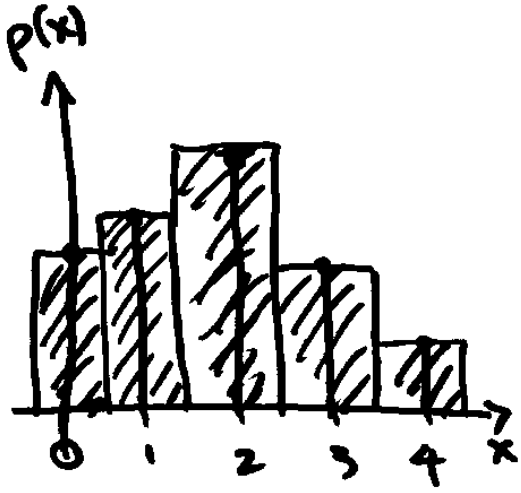
$P(X \leq 4) = p(0) + p(1) + p(2) + p(3) + p(4)$

$= .0590 + .1670 + .2363 + .2229$

$+ .1577 = .8429$

Continuous distributions

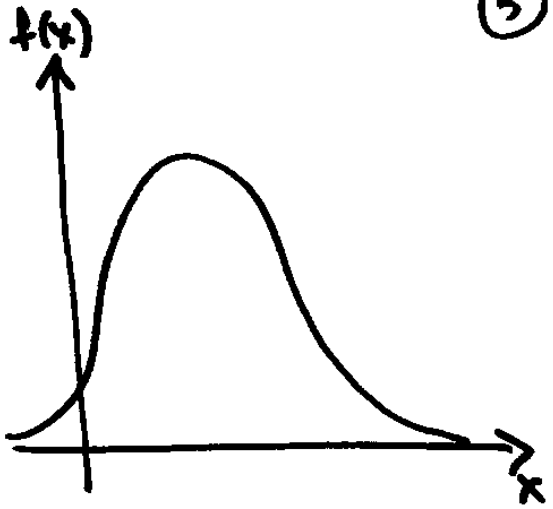
The random variable X is measuring rather than counting.



Total area = 1

Discrete

P(x) tells you the probability of seeing the value x



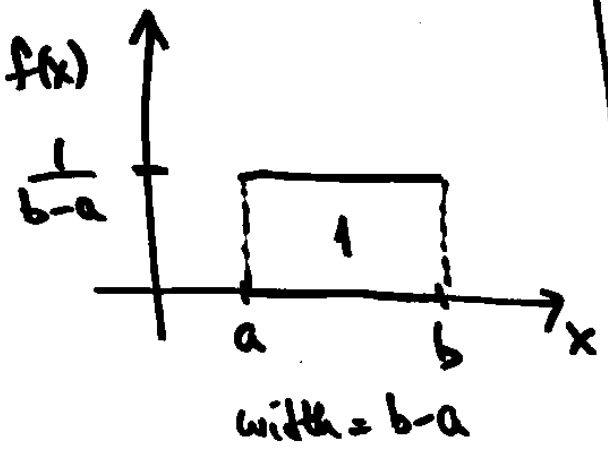
Total area = 1

Continuous

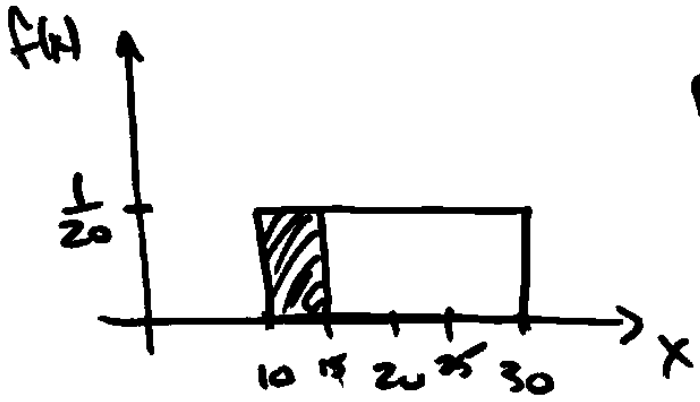
Probabilities are represented by areas under the curve.

Uniform distribution

The random variable X takes on values anywhere between a and b, all equally likely.



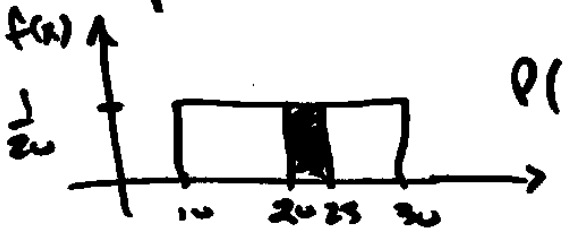
Example: My travel time to work is uniformly distributed between 10 & 30 minutes.



Find the probability that my travel time is less than 15 min.

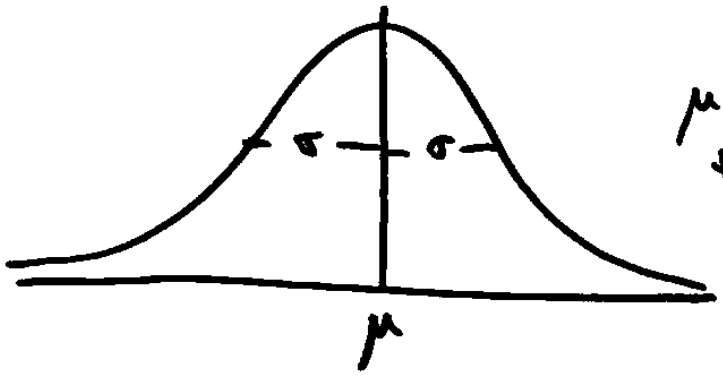
$$P(X<15) = 5 \cdot \frac{1}{20} = \frac{5}{20} = \frac{1}{4} = .25$$

Find the prob. that it takes between 20 & 23 min.



$$P(20<X<23) = 3 \cdot \frac{1}{20} = \frac{3}{20} = .15$$

The normal distribution

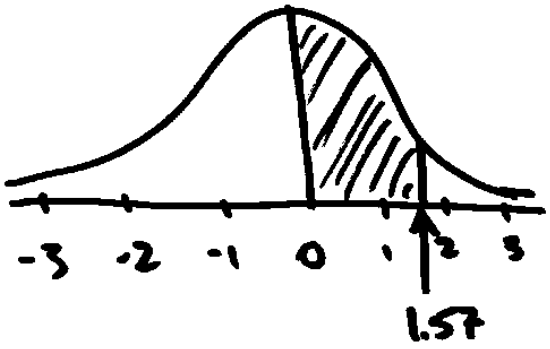


μ and σ are the parameters of the normal distribution

The <u>standard</u> <u>normal</u> <u>distribution</u>

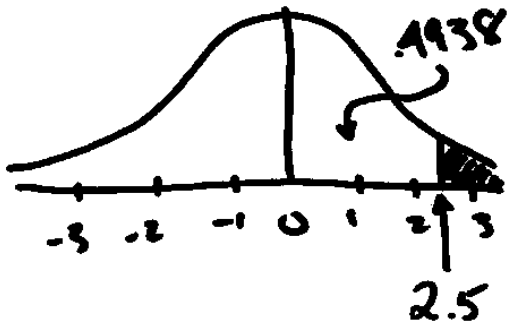
has $\mu = 0$ and $\sigma = 1$

Example: Find the probability of seeing a normal z-score between 0 and 1.57.



$P(0 < z < 1.57) = .4418$

Ex: Find the prob. of seeing a z-score greater than 2.5

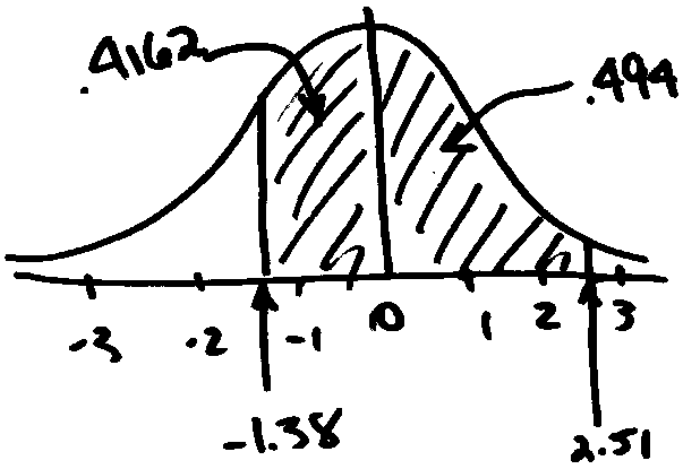


$P(z > 2.5) = .5 - .4938$
$= .0062$

Ex: Find the prob. of seeing a z-score between ± 2.

$P(-2 < z < 2) = 2(.4772)$
$= .9544$

Ex Find the prob. of seeing a z-score between -1.38 and 2.51.



$P(-1.38 < z < 2.51) = .4162 + .4940$
$= .9102$

Hw p.162 #50 (Uniform)

p.165 odds #1-11

Lab #2 is due Thurs. 11-9