Lecture-13

2nd insem: syllabus is from the start of semester.

end sem: syllabus is from the start of the semester.

Recap: Uniform distribution

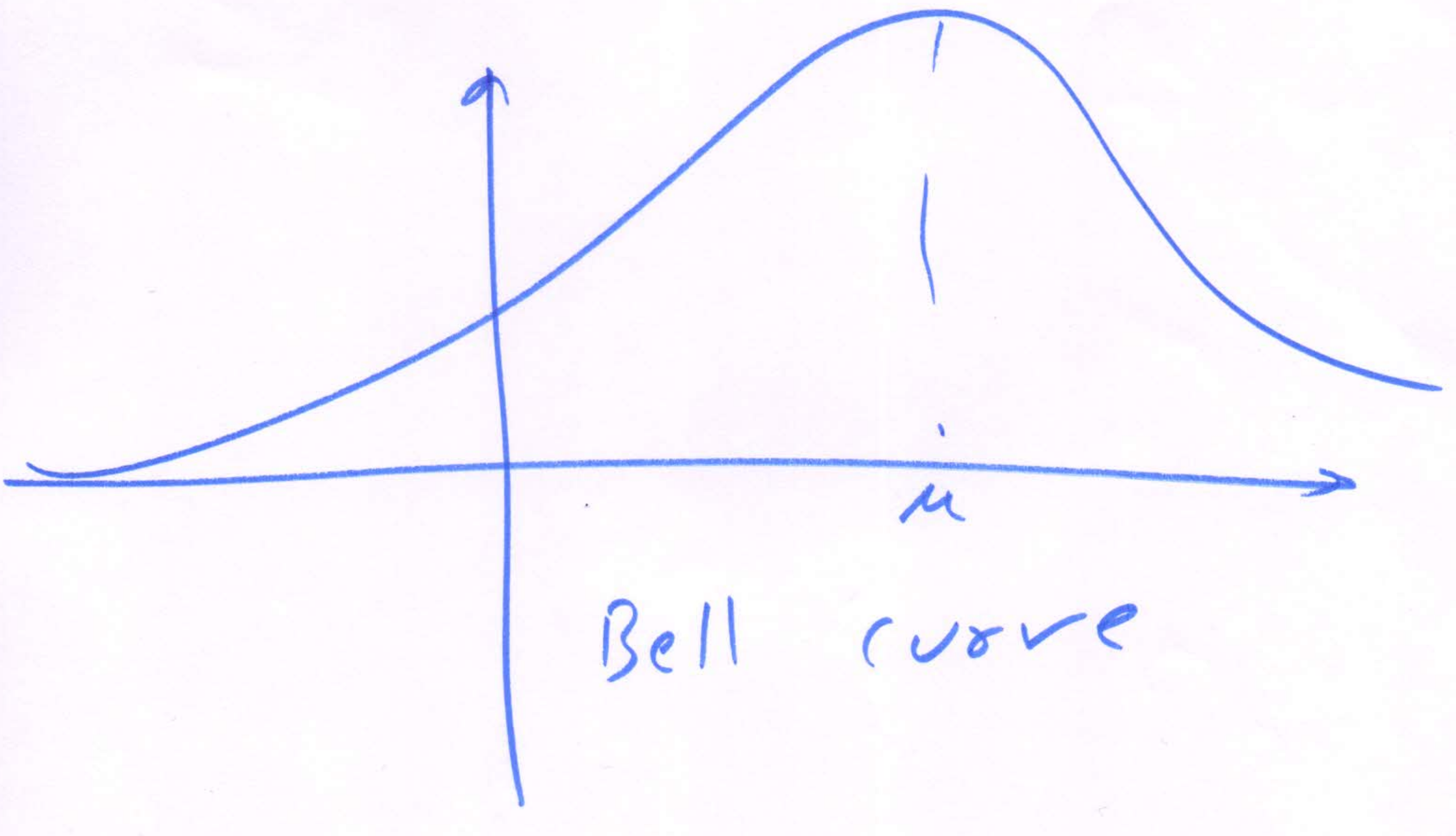
$$P(10 < X < 15) = \cancel{P(< 20} = P(20 < X < 25)$$

Normal distribution

②

X is normally distributed with parameters $\underline{\underline{\mu}}$ & $\underline{\underline{\sigma^2}}$ if the density of X is

$$f(x) = \frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\,\sigma}$$



Bell curve

H.W.

Prove that it's a probability distribution.

$$\int_{-\infty}^{\infty} \frac{e^{-\frac{(x-\mu)^2}{2\sigma^2}}}{\sqrt{2\pi}\,\sigma}\, dx = 1$$

$E[X] = \mu$

$Var(X) = \sigma^2$ H.W.

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if $\mu = 0$, $\sigma^2 = 1$, it is called standard normal distribution: $N(0,1)$

$$\frac{e^{-x^2/2}}{\sqrt{2\pi}}$$

if X is normally distributed, then so is $aX+b$.

$E[X] = \mu$, $Var(X) = \sigma^2$

$E[aX+b] = a\mu + b$,

$Var(aX+b) = a^2\sigma^2$

Cumulative distribution for $N(0,1)$

$$\Phi(a) = \int_{-\infty}^{a} \frac{e^{-x^2/2}}{\sqrt{2\pi}}\, dx$$

There is no closed-form integration for this function.