MATH 16B

Sec. 9.3 – SUMMARY

I) MEASURES OF THE CENTER

① EXPECTED VALUE OR MEAN

$$\boxed{\mu = E(x) = \int_a^b x\, f(x)\, dx}$$

② MEDIAN m

$$P(a \le x \le m) = \boxed{\int_a^m f(x)\, dx = \frac{1}{2}}$$

II) MEASURES OF THE SPREAD

① VARIANCE

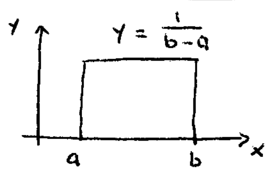
$$\boxed{V(x) = \int_a^b (x-\mu)^2 f(x)\, dx} \quad \text{so} \quad \boxed{V(x) = \left(\int_a^b x^2 f(x)\, dx\right) - \mu^2}$$

② STANDARD DEVIATION σ

$$\boxed{\sigma = \sqrt{V(x)}}$$

III) SPECIAL PROBABILITY DENSITY FUNCTIONS

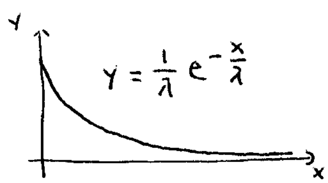
① UNIFORM P.D.F.



$$\boxed{f(x) = \frac{1}{b-a}, \quad a \le x \le b}$$

MEAN: $\mu = \dfrac{a+b}{2}$

② EXPONENTIAL P.D.F.

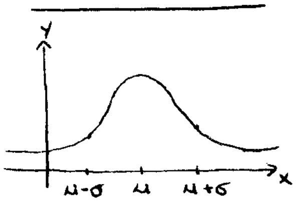


$$\boxed{f(x) = \frac{1}{\lambda} e^{-\frac{x}{\lambda}}, \quad x \ge 0}$$

MEAN: $\mu = \lambda$

STANDARD DEVIATION: $\sigma = \lambda$

③ NORMAL P.D.F.



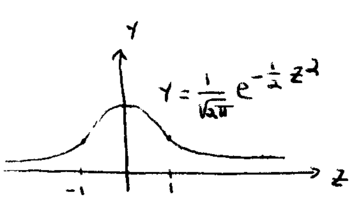
a) $$\boxed{f(x) = \frac{1}{\sigma\sqrt{2\pi}}\, e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}, \quad -\infty < x < \infty}$$

MEAN: μ

STANDARD DEVIATION: σ

b) TAKING $\underline{z = \dfrac{x-\mu}{\sigma}}$ GIVES THE <u>STANDARD NORMAL P.D.F.</u>

WITH $\underline{\mu = 0}$ AND $\underline{\sigma = 1}$:



$$\boxed{f(z) = \frac{1}{\sqrt{2\pi}}\, e^{-\frac{1}{2}z^2}, \quad -\infty < z < \infty}$$