

## KULS Teori Peluang

(1)  $E(x^2)$  distribusi seragam

$$E(x^2) = \int_{-\infty}^{\infty} x^2 f(x) dx$$

$$= \int_a^b x^2 f(x) dx$$

$$= \int_a^b x^2 \left( \frac{1}{b-a} \right) dx$$

$$= \frac{1}{b-a} \left[ \frac{1}{3} x^3 \right]_a^b$$

$$= \frac{b^3 - a^3}{3(b-a)}$$

$$= \frac{(b-a)(b^2 + ab + a^2)}{3(b-a)}$$

$$= \frac{b^2 + ab + a^2}{3} \text{ (terbukti)}$$

$$2) \text{Var}(x) = E(x^2) - (E(x))^2$$

$$= \frac{b^2 + ab + a^2}{3} - \left( \frac{a+b}{2} \right)^2$$

$$= \frac{b^2 + ab + a^2}{3} - \left( \frac{a^2 + 2ab + b^2}{4} \right)$$

$$= \frac{4b^2 + 4ab + 4a^2 - 3a^2 - 6ab - 3b^2}{12}$$

$$= \frac{b^2 - 2ab + a^2}{12}$$

$$= \frac{(b-a)^2}{12}$$

3.) CDF distribusi eksponensial

$$F(x; \theta) = \int_0^x f(t) dt$$

$$= \int_0^x \frac{1}{\theta} e^{-t/\theta} dt$$

$$= \frac{1}{\theta} \int_0^x e^u du (-\theta) \quad (\text{substitusi } u = -\frac{t}{\theta})$$

$$= -1 [e^u]_0^x$$

$$= -[e^{-\frac{t}{\theta}}]_0^x$$

$$= -e^{-\frac{x}{\theta}} + 1$$

$$= 1 - e^{-x/\theta}$$