

$$X \sim B(n, p) \quad Y = \frac{X}{n}$$

$$a) \quad E[Y] = E\left[\frac{X}{n}\right] = \frac{1}{n} E[X] = \frac{1}{n} np = p$$

$$\text{VAR}[Y] = \text{VAR}\left[\frac{X}{n}\right] = \frac{1}{n^2} \text{VAR}[X] = \frac{1}{n^2} npq = \frac{pq}{n}$$

$$* \text{VAR}[X] = npq \quad (\text{VER TAB. DIST. DISCRETAS})$$

$$\text{COMO } \text{VAR}[Y^2] = E[Y^2] - (E[Y])^2 \quad \text{ENTÃO}$$

$$E[Y^2] = \text{VAR}[Y^2] + (E[Y])^2 = \frac{pq}{n} + p^2.$$

$$b) \quad \text{SLIDE 124} : M_{a+bx}(t) = e^{at} M_x(bt)$$

$$\text{COMO } M_x(t) = (q + pe^t)^n$$

$$\text{ENTÃO } M_{\frac{x}{n}}(t) = e^0 (q + pe^{\frac{1}{n}t})^n$$

$$\text{OU SEJA } M_y(t) = (q + pe^{\frac{t}{n}})^n$$