STATS 3N03/3J04 2004-11-03

21-1

WHAT YOU NEED TO KNOW FROM § 5-6
[EXERCISES 5-82, 5-84]

IF $X, Y \sim$ BIVARIATE NORMAL
WITH PARAMETERS

$$\mu_X, \mu_Y, \sigma_X^2, \sigma_Y^2, \rho$$

WHERE $\rho = \dfrac{\sigma_{XY}}{\sigma_X \sigma_Y}$

THEN:

MARGINAL DISTRIBUTIONS

$$X \sim N(\mu_X, \sigma_X^2)$$

$$Y \sim N(\mu_Y, \sigma_Y^2)$$

CONDITIONAL DISTRIBUTIONS:

$X \mid Y = y$

$$\sim N\left(\mu_X + \rho \frac{\sigma_X}{\sigma_Y}(y - \mu_Y),\ \sigma_X^2(1-\rho^2)\right)$$

$Y \mid X = x$

$$\sim N\left(\mu_Y + \rho \frac{\sigma_Y}{\sigma_X}(x - \mu_X),\ \sigma_Y^2(1-\rho^2)\right)$$

i.e.

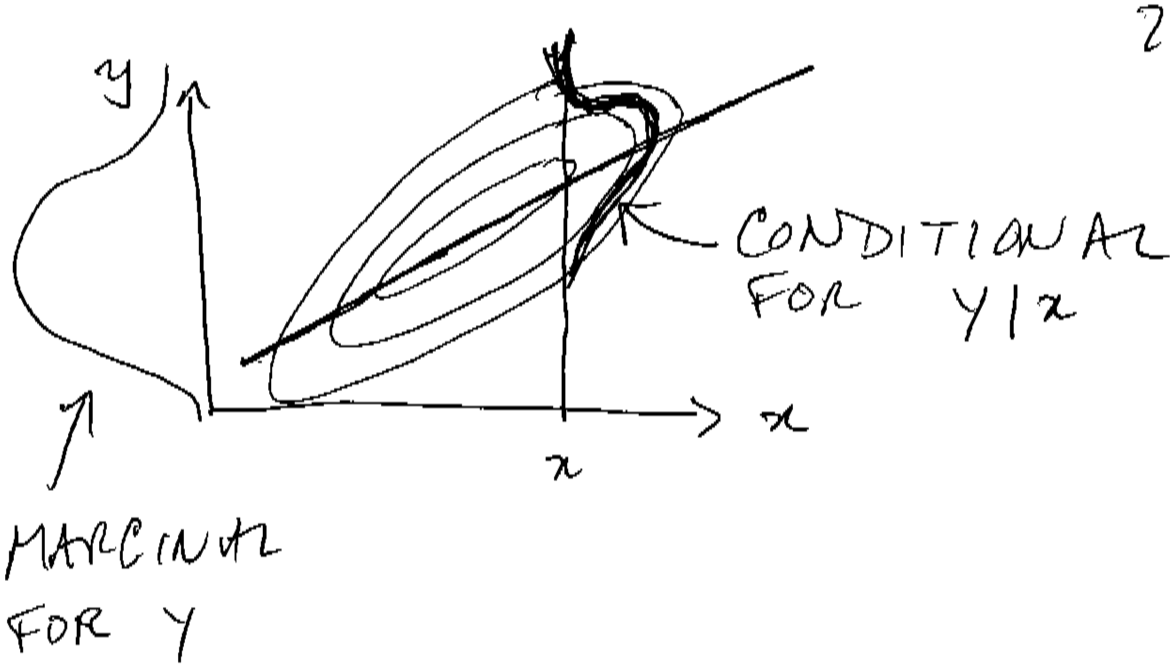
"REGRESSION OF THE MEAN ON x"

CONDITIONAL MEAN:

$$E(Y \mid X = x) = \mu_Y + \rho \frac{\sigma_Y}{\sigma_X}(x - \mu_X)$$

CONDITIONAL VARIANCE:

$$E(Y \mid X = x) = \sigma_Y^2 \underbrace{(1-\rho^2)}_{\text{REDUCTION IN VARIANCE IF YOU KNOW } x}$$



REVIEW:

POINT ESTIMATE
SAMPLING DISTRIBUTION
CENTRAL LIMIT THEOREM
$\Rightarrow$ A02 Q4

REVIEW EXERCISES

4-51, 4-87
3-129, 3-25