X RV WITH DENSITY $f(x)$

THEORETICAL EXPECTATION $E(X) = \int_{-\infty}^{\infty} x\, f(x)\, dx$

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

$VAR(X) = E\left[(X - E(X))^2\right] = E(X^2) - (E(X))^2$

LET (X, Y) BE A 2 DIMENSIONAL RV WITH JOINT DENSITY $f(x,y)$

MARGINAL DENSITY OF X : $f_1(x) = \int_{-\infty}^{\infty} f(x,y)\, dy$

MARGINAL DENSITY OF Y : $f_2(y) = \int_{-\infty}^{\infty} f(x,y)\, dx$

$Y \mid X = x$, DENSITY OF THIS COND. DIST. $f_{2|1}(y|x) = \frac{f(x,y)}{f_1(x)}$

CONDITIONAL DIST FUNCTION $F_{2|1}(y|x) = \int_{-\infty}^{y} f_{2|1}(t|x)\, dt$