This lecture time: CDFs; next lecture time: joint distributions

(syllabus: readings)

mode = point of symmetry = mean = median

$f_X(x)$

X cont.

PDF of X

1-dimensional rv

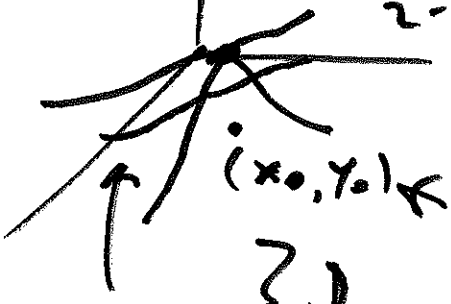
$P(X = x_0) = 0$

0-dimensional

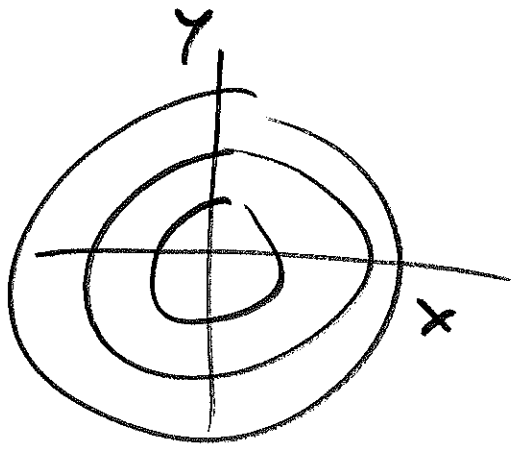
$f_{XY}(x, y)$

X, Y cont. (2-dim.)

$c\, e^{-(x^2+y^2)}$



3D perspective plot



2D contour plot of

$$\int_{-\infty}^{\infty}\left[\int_{-\infty}^{\infty} c x^2 y \, dy\right] dx = \iint_S c x^2 y \, dy \, dx$$

$$= \int_{-1}^{+1}\left[\int_{x^2}^{1} c x^2 y \, dy\right] dx = \frac{14}{21}$$

$$\int_{-1}^{+1}\int_{x^2}^{2} x^2 y \, dy \, dx = \frac{4}{21}$$

$$c = \frac{21}{4}$$

$$\int_0^1 \left[\int_{-\sqrt{y}}^{+\sqrt{y}} x^2 y \, dx\right] dy = \frac{4}{21}$$

$$x^2 \le y$$

$$-\sqrt{y} \le x \le +\sqrt{y}$$

$$P(X \geq Y) = \iint_{S_0} f_{XY}(x,y)\,dy\,dx$$

$$\int_0^1 \left[\int_{x^2}^{x} \frac{21}{4} x^2 y \, dy \right] dx$$