(102) binomial

$$f(x) = \begin{cases} \binom{n}{x} p^x q^{n-x} & \text{if } x = 0, 1, ..., n \\ 0 & \text{otherwise} \end{cases}$$

(129) marginal

$$f_1(x) = \int_{-\infty}^{\infty} f(x,y)dy$$
$$f_2(y) = \int_{-\infty}^{\infty} f(x,y)dx$$

(139) conditional

$$g_1(x \mid y) = \frac{f(x,y)}{f_2(y)}$$
$$g_2(y \mid x) = \frac{f(x,y)}{f_1(x)}$$

(161) $Y = r(X)$: if $r(x)$...then for y in the range ...

$$g(y) = f(s(y)) \left| \frac{d}{dy} s(y) \right|$$

(166) $Y_n = \max(X_1, ...X_n)$, $Y_1 = \min(X_1, ..., X_n)$

$$g_n(y) = n \left[F(y)\right]^{n-1} f(y)$$
$$g_1(y) = n \left[1 - F(y)\right]^{n-1} f(y)$$
$$g(y_1, y_n) = n(n-1) \left[F(y_n) - F(y_1)\right] f(y_1) f(y_n)$$

(168) $Y_1 = r_1(X_1, X_2)$, $Y_2 = r_2(X_1, X_2)$

$$g(y_1, y_2) = f(s_1(y_1, y_2), s_2(y_1, y_2)) \left| \frac{\partial s_1}{\partial y_1} \frac{\partial s_2}{\partial y_2} - \frac{\partial s_1}{\partial y_2} \frac{\partial s_2}{\partial y_1} \right|$$

(172) convolution

$$g(y) = \int_{-\infty}^{\infty} f_1(y-z) f_2(z) dz$$

(185, 190) expectation

$$E(r(X)) = \int_{-\infty}^{\infty} r(x) f(x) dx$$
$$E(aX + b) = aE(X) + b$$
$$E(XY) = E(X)E(Y) \boxed{\text{IF...}}$$