- E(max(X,Y)) = (a + b)/2 by symmetry (see graph)
- X ~ U (0, 5)

  Y ~ U $-x^2/25 < y < -x^2/25$

  ⇨ Y|X=4 ~ U(-16/25,16/25)

- X and Y~ U $0 < x < \sqrt{y}$

  ⇨ X|Y ~ U(0, $\sqrt{y}$)

- X has the uniform distribution on the unit interval: X ~ U(0,1)

$$E(\max(X_1, \dots, X_n)) = \int_0^a 1dx + \int_a^b s(x)dx$$

  NB. –It's 1 because of the graph (as usual).

- E(X|X≥3) = E(X) + 2 for a Geometric
- $E(\min(X_1, \dots, X_n)) = \frac{1}{\sum \lambda_i}$ (shortcut for an exponential)

- For an Exponential:

  No memory:

  -P(X>m+n|X>m) = P(X>n)

  -Var(Y|X>3 and Y>3) = Var(Y|Y>3), because of independence

  = Var(Y), because of no memory

  -E[$(X-1)^3$|X≥1] = E(X^3)

- For a Poisson:

  X ~ P(λ^2) => X+Y ~ P($5\lambda^2$)

  Y ~ P($4\lambda^2$)

- For a Poisson:

E(Y) = 0.2*1 +0.4*2 = 1

- $Mode = \begin{cases} x\ in\ f'(x) = 0, & with\ discrete\ function \\ \text{x with the biggest probability,} & with\ continuous\ function \end{cases}$

NB. –For the discrete case, the value with the biggest probability is the probability before it decreases.

- $P(X \leq 3/4|Y = 1/2) =$ 0 ≤ y ≤ x ≤ 1

$\int_{1/2}^{3/4} f_{X|Y}(X|1/2)\, dx,$ with continuous function

where $f_{X|Y}\left(X\middle|\frac{1}{2}\right) = \frac{f_{X,Y}(X,1/2)}{f_Y(1/2)}$

$P(X \leq 3/4|Y = 1/2) = \frac{P(X \leq 3/4, Y=1/2)}{P(Y=1/2)},$ with discrete function

- $P(X \leq 3/4|Y \geq 1/2) = \frac{P(X \leq 3/4, Y \geq 1/2)}{P(Y \geq 1/2)},$ with discrete or continuous function

- Var(H|L=0) = E[(H|L=0)^2] – (E(H|L=0))^2,

where E(H|L=0) using P(H=0|L=0) and P(H=1|L=0) (for example)

P(H=0|L=0) = $\frac{P(H=0, L=0)}{\text{P(L=0)}}$

- $P\left(X \leq \frac{1}{2} or\ Y \leq \frac{1}{2}\right) = P\left(X \leq \frac{1}{2}\right) + P\left(Y \leq \frac{1}{2}\right) - P(X \leq \frac{1}{2}, Y \leq 1/2)$

- $E(\max(X_1, \dots, X_n)) = \int y f_{max}(y) dy,$

where $f_{max}(y) = \frac{d}{dy} P(\max(X_1, \dots, X_n) \leq y) = \frac{d}{dy} \prod_{i=1}^{n} P(X_i \leq y)$

$= \frac{d}{dy}\left(F_x(y)\right)^n$

- E(max(T,2)) = $\int_0^2 2f(x)dx + \int_2^\infty x f(x) dx$

- -Univariate distribution :

$E(\min(X_1, \dots, X_n)) = \int x f_{min}(x) dx,$