CDA6530 - lecture 10

Note Title 9/22/2011

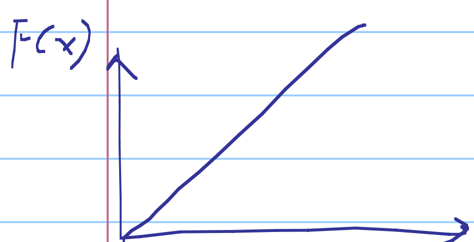
$$p_i = P(X=i) = e^{-\lambda}\frac{\lambda^i}{i!}, \quad i = 0, 1, \cdots$$

$p_0, \; p_1, \; p_2, \; \ldots\ldots \qquad p_{250} \le \varepsilon = 0.001$

$X \in [0, 1, 2, \ldots\ldots, 250, 251]$

$\text{if}\left(U > \sum_{i=0}^{250} p_i\right) \quad X = 251$

$p(a<b) \Rightarrow p(f(a) < f(b))$ if f() is monotonic



$$F^{-1}(U) = -\ln(1-U)/\lambda$$

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for i=1:1000,
    U = rand();
    x = -log(1-U)/lambda;
    X(i) = x;
end
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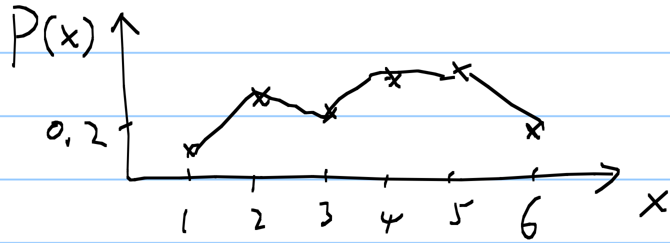
$[1, 2, 2, 4, 6, 5, 6, 2, 3, 3]$



$P(X=6) = \frac{2}{10}$

$P(X=1) = \frac{1}{10} = 0.1$

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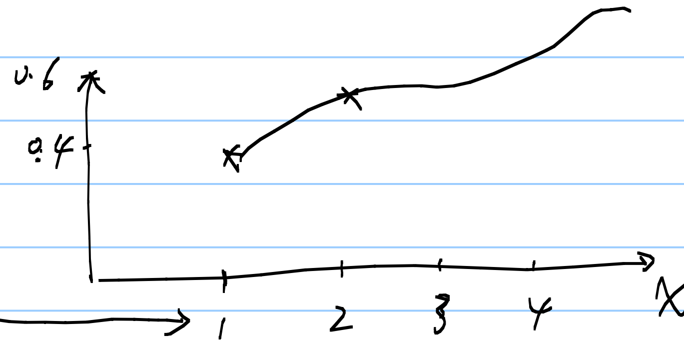
$P(X<x)$



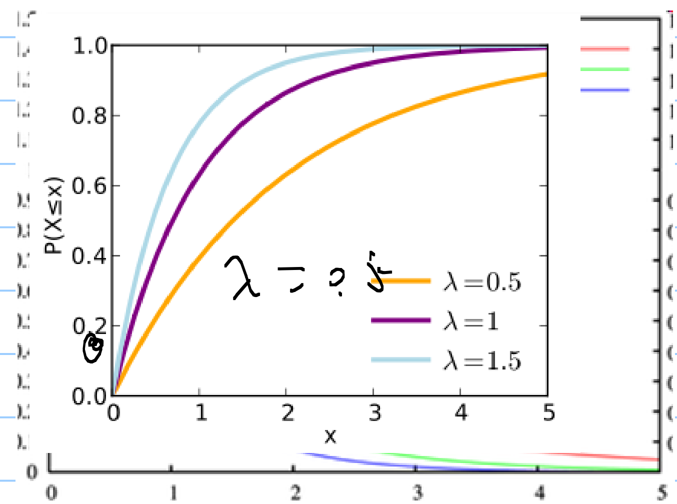
$X \sim \exp(\lambda)$

$\lambda = 0.5$

$[0.1, 0.2, 2.1, 1.2, 3.2, 0.5, 2.3]$

$P(X<1) = \frac{3}{7} \approx 0.4$

$P(X<2) = \frac{4}{7} \approx 0.6$



$$E[g(X)] = \int_{-\infty}^{\infty} g(x) f(x) dx$$

$$E[g(U)] = \int_{-\infty}^{\infty} g(x) \cdot f_U(x)\, dx = \int_0^1 g(x)\, dx$$

$$f_U(x) = 1 \quad \text{if } 0 < x < 1$$

$P(x_N, \pi_N \mid \pi_{N-1})\, P(x_{N-1}, \pi_{N-1} \mid \pi_{N-2}) \ldots\ldots P(x_2, \pi_2 \mid \pi_1)\, \underline{P(x_1, \pi_1)} =$ $\rightarrow P(AB)$

$P(x_N \mid \pi_N)\, P(\pi_N \mid \pi_{N-1}) \ldots\ldots P(x_2 \mid \pi_2)\, P(\pi_2 \mid \pi_1)\, \underline{P(x_1 \mid \pi_1)\, P(\pi_1)} =$ $\rightarrow p(A|B) \cdot p(B)$

$a_{0\pi 1}\, a_{\pi 1 \pi 2} \ldots\ldots a_{\pi N\text{-}1 \pi N}\, e_{\pi 1}(x_1) \ldots\ldots e_{\pi N}(x_N)$

$$p(x_2 \pi_2 | \pi_1) = p(\cancel{x_2} | \pi_2, \pi_1) \cdot p(\pi_2 | \pi_1)$$

$$= p(x_2 | \pi_2) \cdot p(\pi_2 | \pi_1)$$