Note Title 2/9/2011

HW5 Q8

The number of page requests that arrive at a Web server is Poisson W. avg 6000 requests per minute.

Q: P(No request in 100 ms)

Q: P(5 to 10 requests in 100 ms)

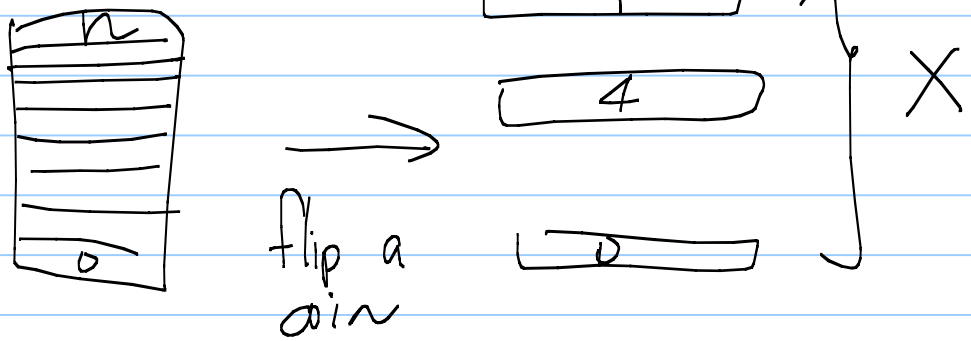
Q: If more than 15 requests in 100 ms. The server crashes

P(server crashes) = ?

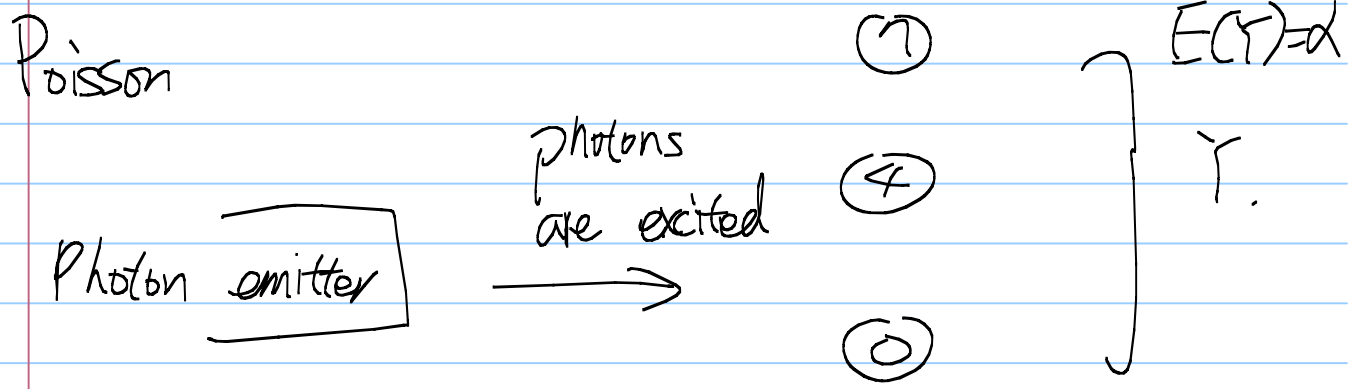
Ans:

* The connection between binomial & Poisson distributions. $E(X)=np$

Binomial



Poisson



The difference is that there are thousands of millions different photon that may go through the laser, but only a very small fraction of them can go through.

I.e. For binomial distribution, we keep

Then we have Binomial

* In sum: Poisson is the limit of a binomial with $n \to \infty$, $p = \frac{\alpha}{n}$

Note Title 2/11/2011

1. Many different R.Vs. (discrete thus far)
2. The W.A.
3. Expectation & variance
4. New computation skills.
5. The same counting principle

Continuous R.Vs.

1. Sample space is continuous.
2. The W.A is specified by the

plotting $f_X(x)$ is just like plotting any function except that

3. Expectation (Weighted average)

Ex: $f_X(x) = \begin{cases} \frac{1}{3} & \text{if } 0 \le x \le 3 \\ 0 & \text{otherwise} \end{cases}$

Q: Find $E(X) = ?$ Ans:

* Expectation of a constant is the constant itself.

* Expectation is linear

Again, we use the same formulas of expectation to define the "variance"

We can also define

* The n-th moment

* The n-th central moment

0915

Important Conti R.V. Table 4.1 p.164

1.

Ex: The computer picks up a random number between $[a, b]$.

2.

Ex: Customers arrive at the average rate λ customer/per unit time. The amount of waiting time for the 1st customer is modeled by an exponential R.V.

Ex: average $\lambda =$ 30 customers/hour

We can also say the average arrival is $\lambda = 0.5$ customers/minute

Q: P(The first time we see a customer is > 30 min)

Ans:

* Bernoulli (p):

* Binomial (n, p):

* Geometric (p):

* Poisson (λ):

* Poisson is a limiting case of binomial.

* Exponential (λ).

Eg.