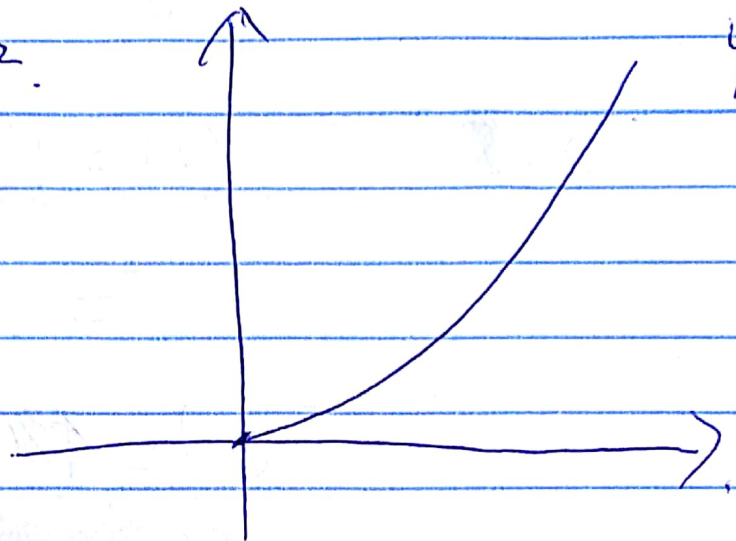


11/10/17.
~~08/06/17.~~

Q. gamma function

$$y = x^2.$$



$$x = 1, 2, \dots, n.$$

$$y = 1, 4, 9, \dots$$

$$y = 1.5^2, 2.7^2.$$

$$y = k!$$

we know $k = 1, 2, 3, \dots$

$$y = 1! = 1.$$

$$y = 2! = 2.$$

$$y = 3! = 6.$$

\vdots

Q what about
 $k = 1.5$.

$$y = 1.5!$$

$$= \bigcirc ?$$

def. $\Gamma(n) = \int_0^{\infty} x^n e^{-x} \cdot dx$ *

$n=3$ $\Gamma(3) = \int_0^{\infty} x^3 \cdot e^{-x} dx$

=

$\Gamma(n) = (n-1)!$

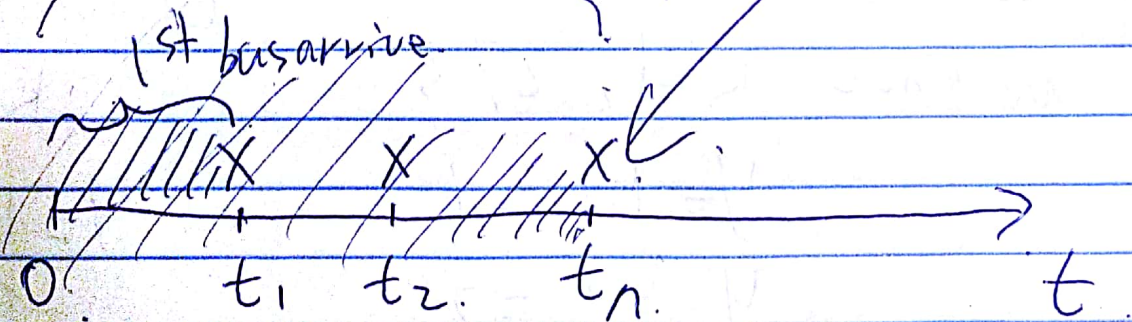
$\Gamma(3) = 2! = 2 \times 1 = 2$

later on

$\Gamma(1.5) =$

α^{th} event

② Gamma distribution



Q What about the dist of waiting time for the α^{th} event occurred?

$$F(w) = P(W \leq w).$$

$$= 1 - P(W > w).$$

A handwritten scribble consisting of a circle with a cross inside, followed by two horizontal lines. To the right of this is a large, empty rectangular box drawn with a single blue line, spanning most of the width of the page. The background is lined paper with horizontal blue lines.

$$F'(w) = \begin{bmatrix} \\ \\ \end{bmatrix}$$

pdf for the

Def

pdf

$$f(x) = \frac{1}{(\alpha-1)! \cdot \beta^\alpha} \cdot x^{\alpha-1} \cdot \exp\left(-\frac{x}{\beta}\right)$$

$$(\alpha-1)! = \Gamma(\alpha)$$

$$\beta: \beta = \frac{1}{\lambda}$$

$$\alpha = 1 \quad f(x) = \frac{1}{(1-1)! \cdot \beta^1} \cdot \underline{x^{1-1}} \cdot \exp\left(-\frac{x}{\beta}\right)$$

$$= \frac{1}{\beta} \exp\left(-\frac{x}{\beta}\right). \quad (11)$$

def. $f(x) = \frac{1}{\Gamma(\alpha) \cdot \beta^\alpha} \cdot x^{\alpha-1} \cdot \exp\left(-\frac{x}{\beta}\right)$
 $x \geq 0$.

① $\Gamma(\alpha) = \cancel{(\alpha-1)!}$ α is integer

② $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

$$E(X) = \alpha \cdot \beta$$

$$\text{Var}(X) = \alpha \cdot \beta^2$$

Ex.

$$N(\mu, \sigma^2)$$

$$P_0(\pi)$$