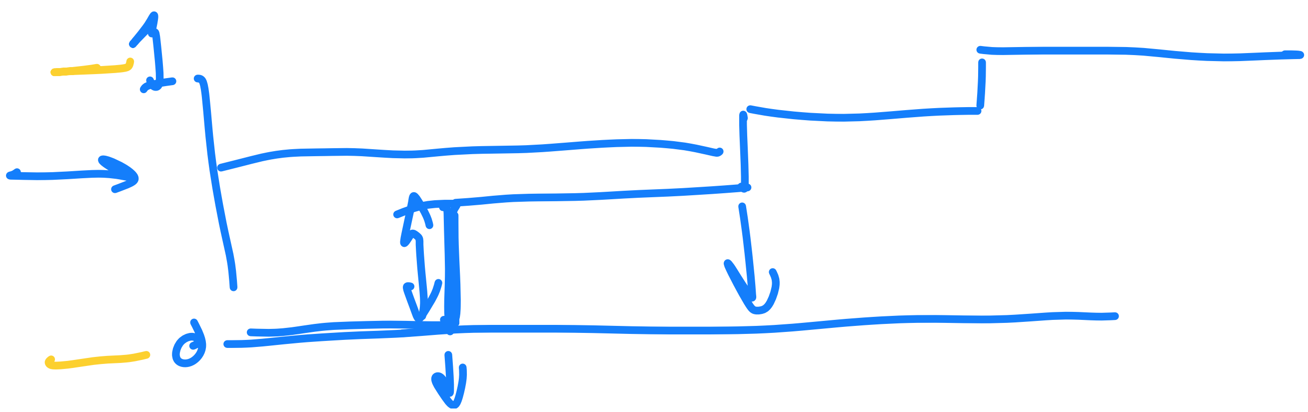
Generating Random #s.

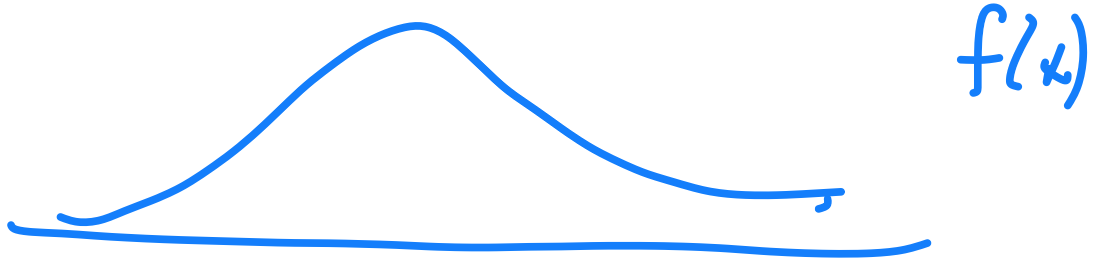
$u \sim U(0,1)$

Ex. Bernoulli

$$b = \begin{cases} 1 & u \le p \\ 0 & > p \end{cases} \qquad b = \begin{cases} 0 & u \le 1-p \\ 1 & u > 1-p \end{cases}$$



Cont. RV's.



$F^{-1}(x) \equiv F^{inv}(x)$

Exp RV's.

$$F(x) = 1 - e^{-\lambda x}$$

$$X = -\frac{\ln(U)}{\lambda}$$

Note:
many distributions - formulas & approx
Normal.

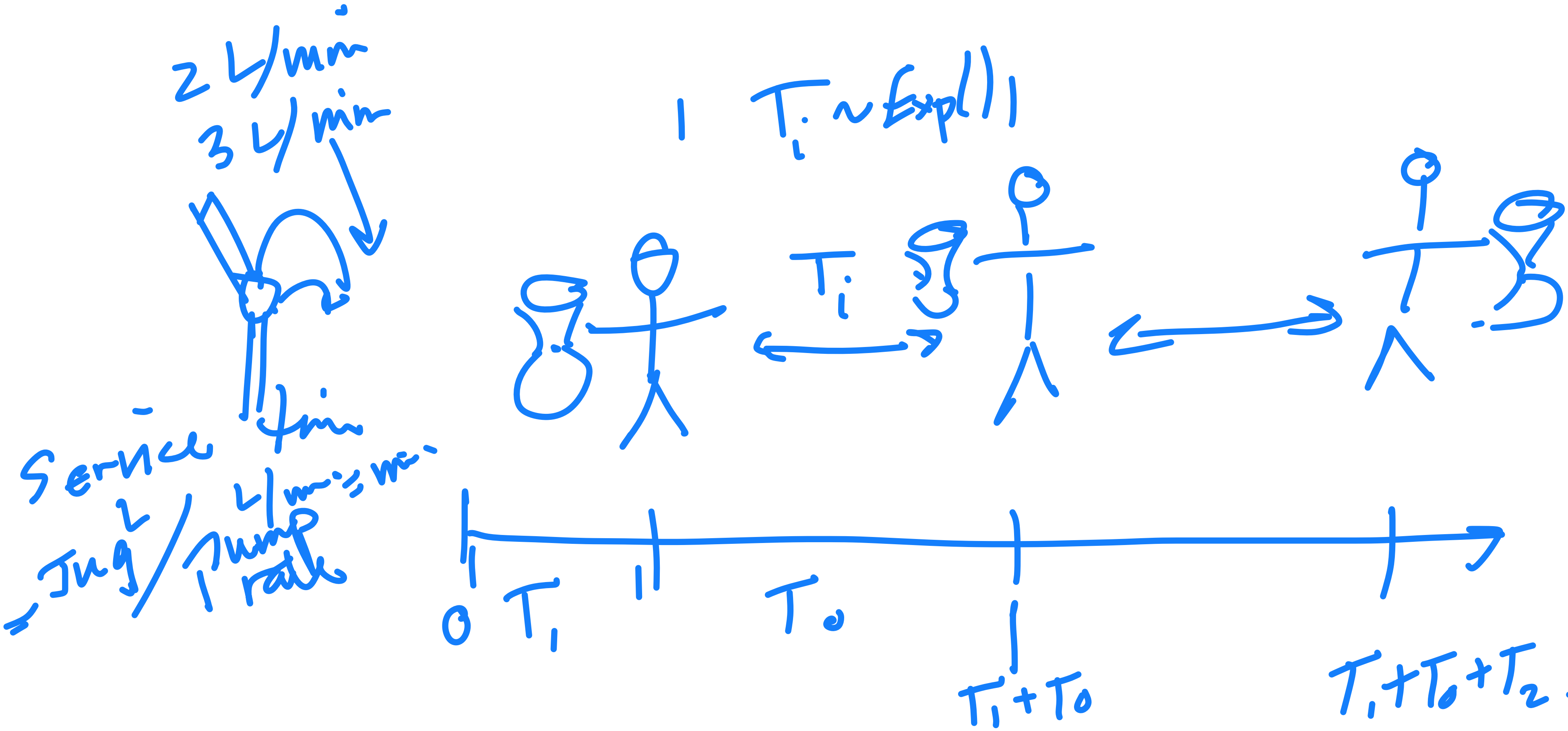
Simulations

1) Identify random variables
   - strategy for generation
2) Generate #s
3) Apply "model"
4) Analyze outcomes.
   descriptive statistics

HW 7 - Q2

Scenario

$\lambda = \frac{1}{\text{min}}$ $n = 120 \times \lambda$.

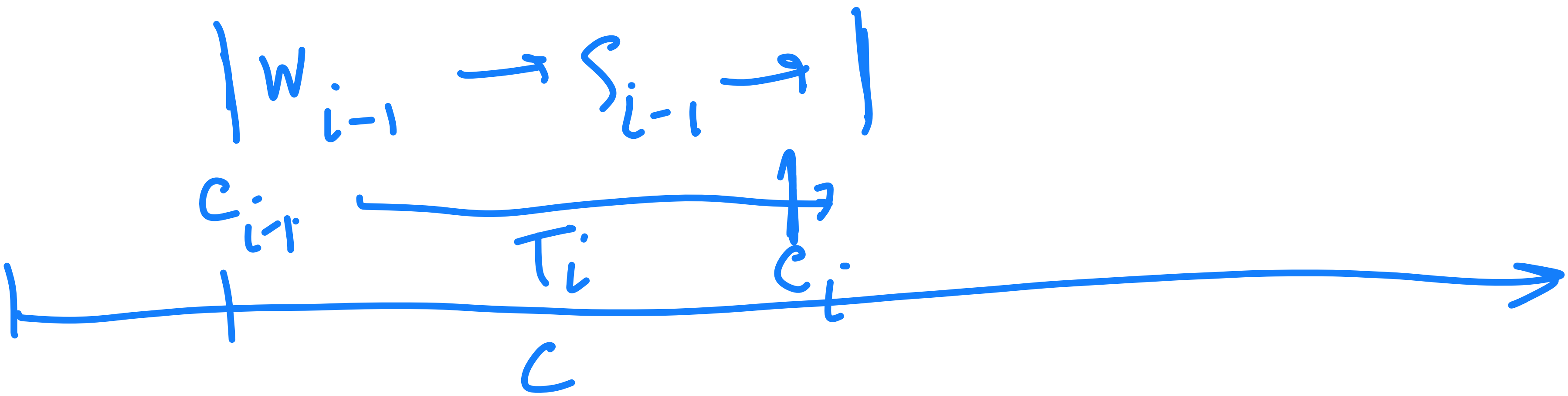


$$W_i = \max\{W_{i-1} + S_{i-1} - T_i, 0\}.$$

waiting time

service time

Time between arrival i-1 and T_i

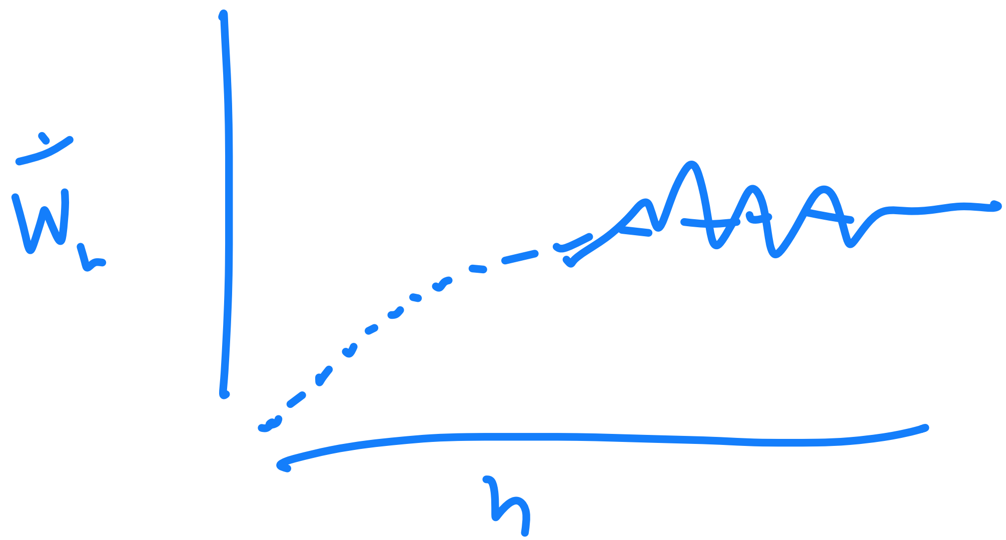


waiting times

mean, median, max, 95% percentile

histogram

$$\overline{W}_n = \frac{\sum_{i=1}^{n} W_i}{n}.$$



Linear Regression

Fitting models

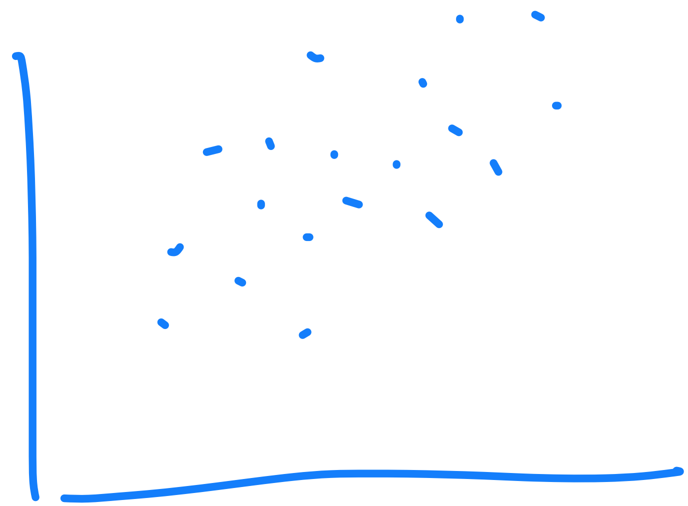
$y_i = \alpha + \beta x_i + \varepsilon_i$

dependent – y_i

ε_i – random noise

$\varepsilon_i \sim U(\ )$

$E[\varepsilon_i] = 0$



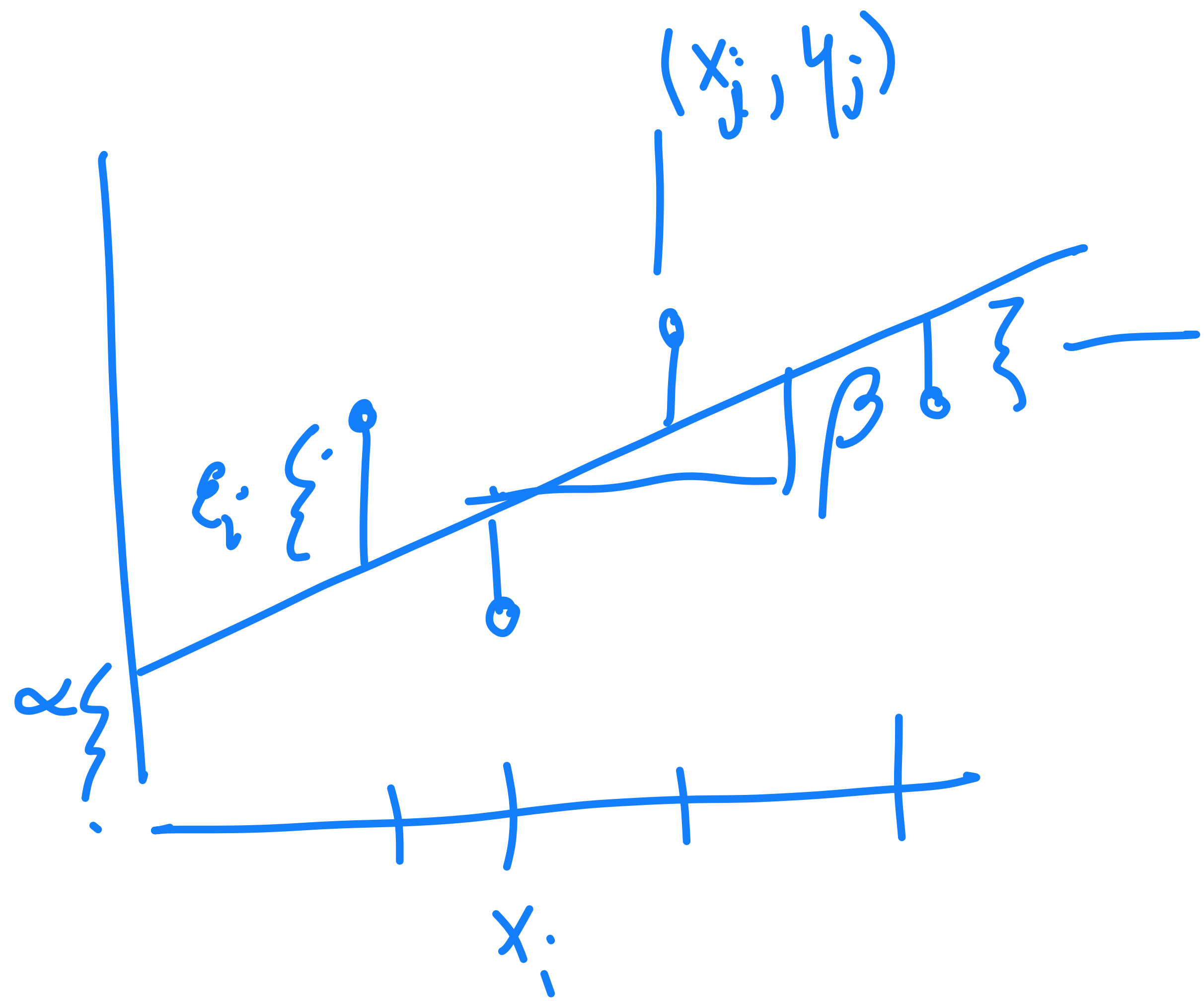
x_i – independent

Models.

Generative model.

Find parameters

α, β $\qquad$ ξ - parameters of dist



(x_j, y_j)
ε_i
α
β
x_i

Method of least squares

Objective function / penalty.

$$S(\alpha, \beta) = \sum_{i=1}^{n} (y_i - \alpha - \beta x_i)^2$$