Applications Programming

General Introduction of Computerized Model

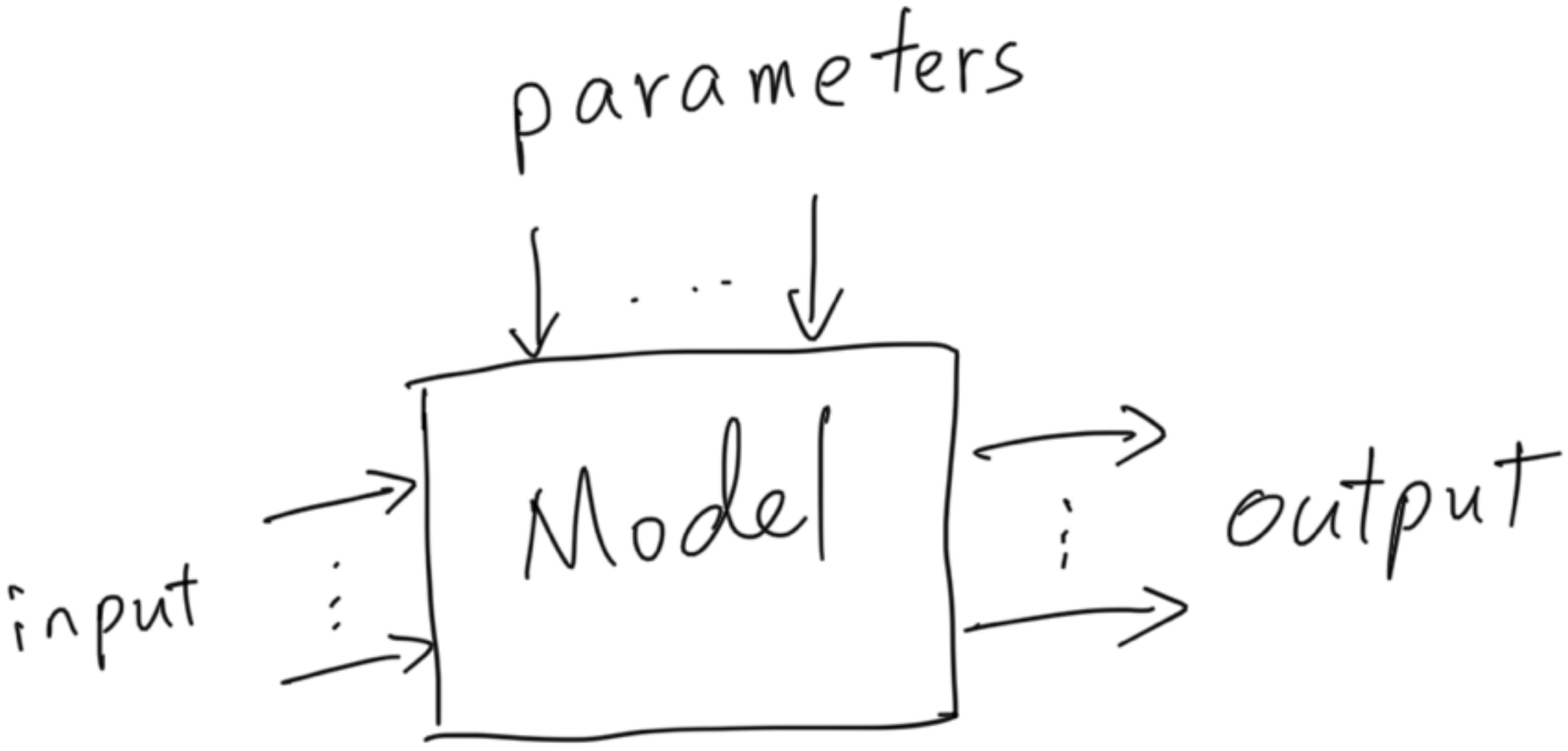
Math Model

- Definition from Wiki: A mathematical model uses mathematical language to describe a system.
- Usual mathematical models
  - Dynamic systems
  - Statistical models
  - Differential equations
  - Game theoretic models
- Where does Math Model come from? — Domain knowledge.

Math Model Applications

- Analyzing scientific data
- Process simulation
- Predictive model building
- Inventory control and monitoring
- Data visualization
- Record keeping, tracking and maintaining
- Many many more ...

Model Parameters, Input



Model Building Steps

- Collect data and domain knowledge
- Build the (usually computerized) model
- Validate model using the collected data (tuning the parameters)
- Deploy the model, usually for prediction/simulation/ analysis

Math Model Example

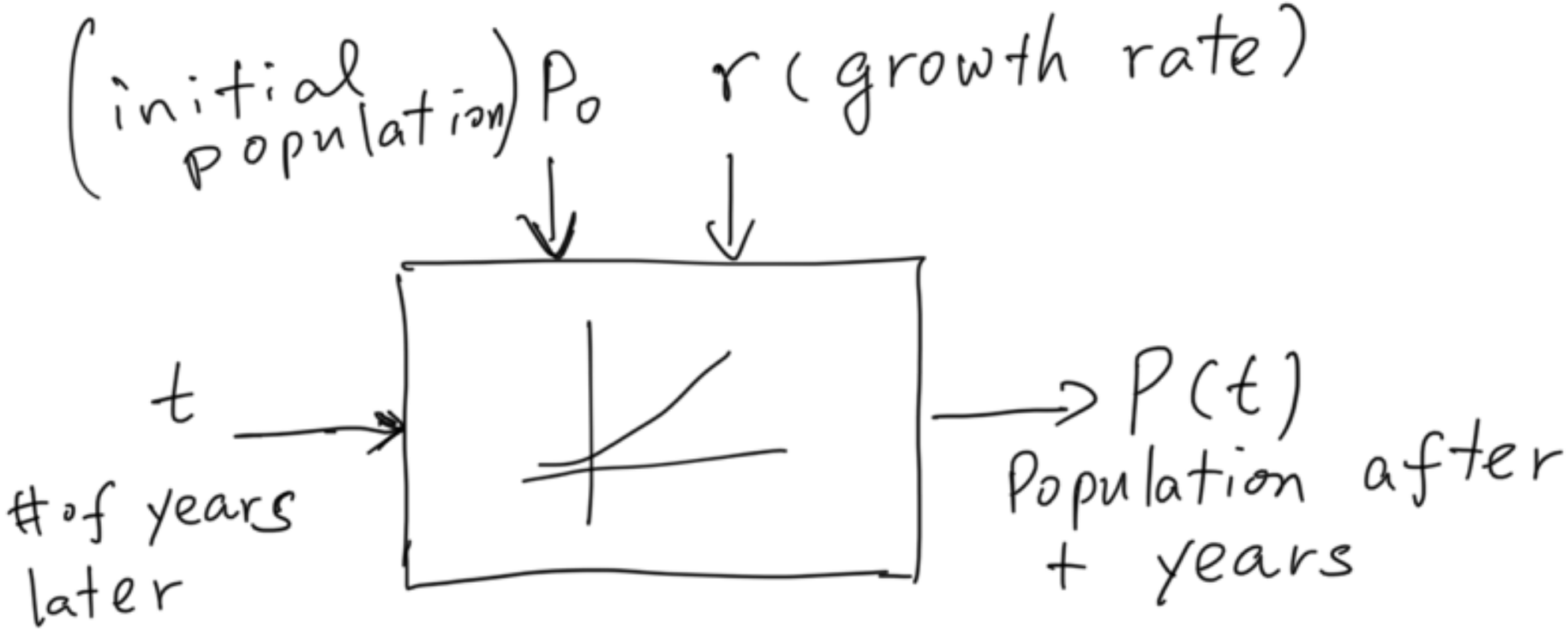
Population growth:

The Malthusian growth model, sometimes called the simple exponential growth model, is essentially exponential growth based on a constant rate of compound interest. The model is named after the Reverend Thomas Malthus, who authored An Essay on Principle of Population, one of the earliest and most influential books on population.

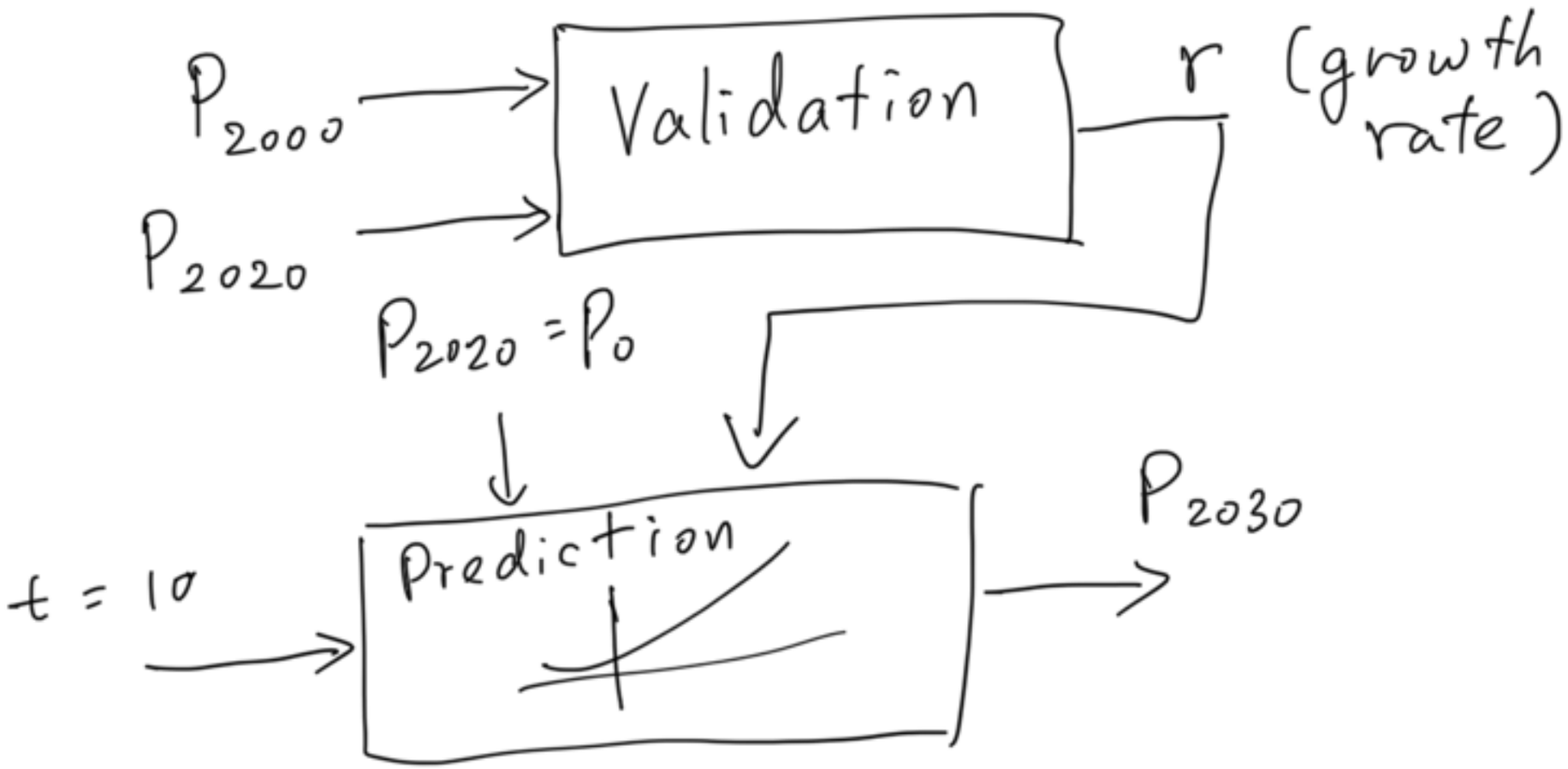
The formula is: $P(t) = P_0 * e^{rt}$

where P_0 = Initial Population, r = growth rate, sometimes also called Malthusian Parameter, t = time.

Population Growth Model



With Validation



Computerized Model

- Using Excel spreadsheet and its build in tools
- Using VBA to write programs