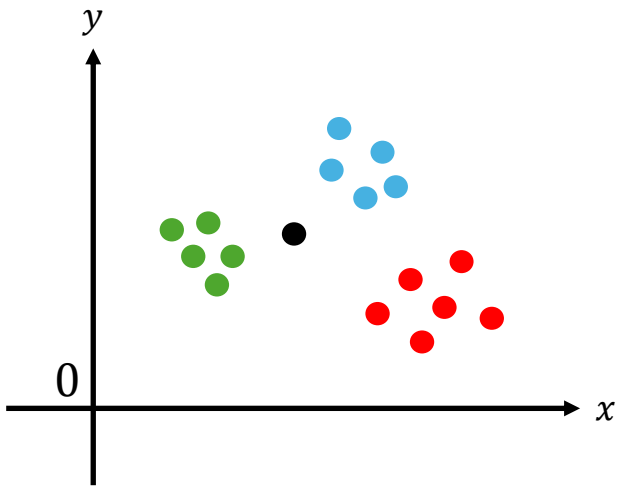
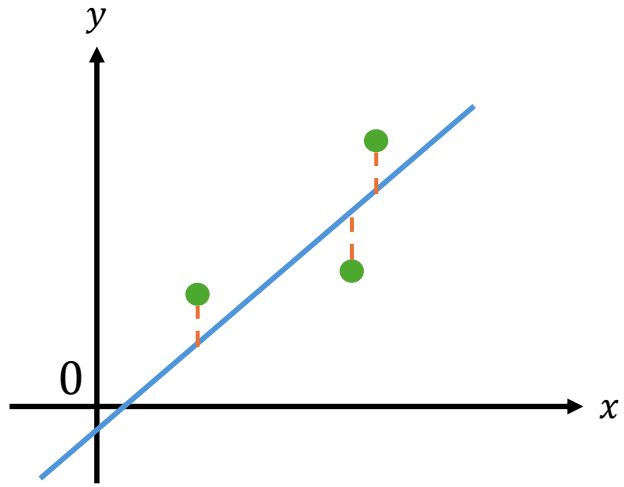
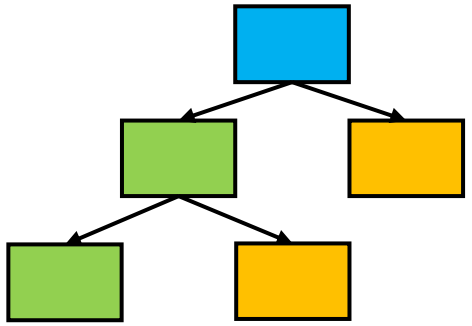
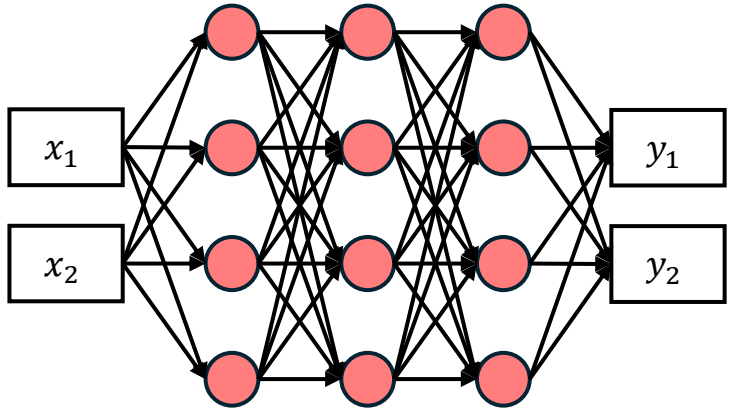
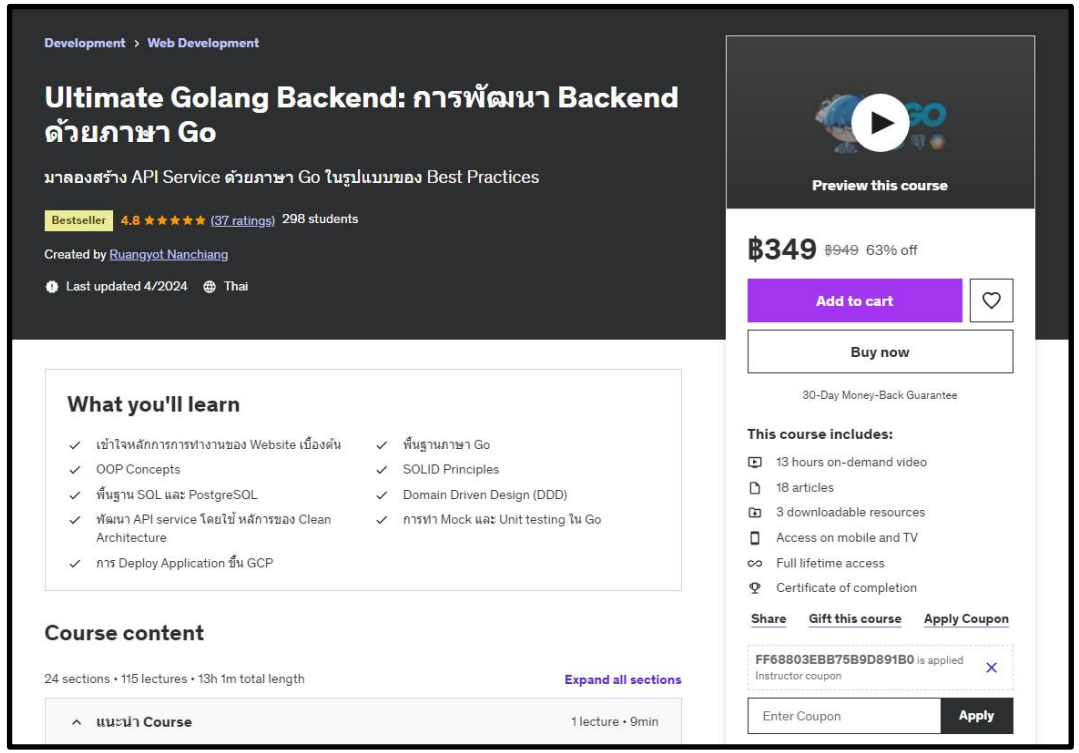
Artificial Intelligence
AKA. AI










Development › Web Development
Ultimate Golang Backend: การพัฒนา Backend ด้วยภาษา Go
มาลองสร้าง API Service ด้วยภาษา Go ในรูปแบบของ Best Practices
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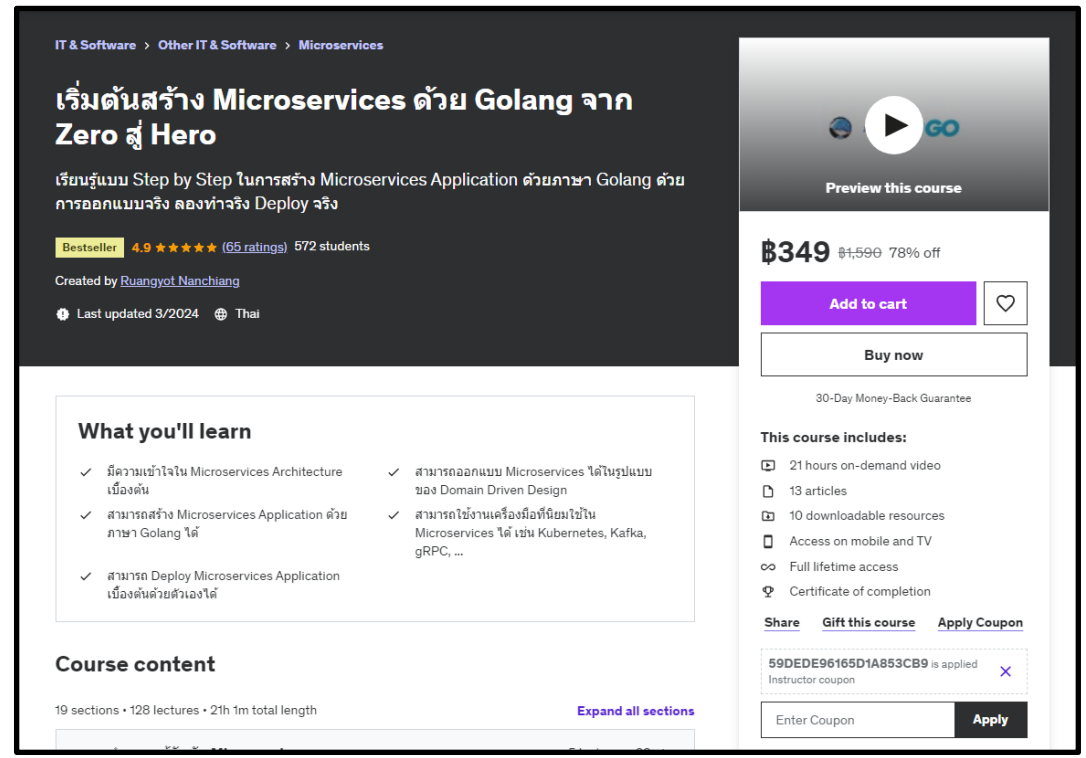
What you'll learn
เข้าใจหลักการการทำงานของ Website เบื้องต้น
OOP Concepts
พื้นฐาน SQL และ PostgreSQL
พัฒนา API service โดยใช้ หลักการของ Clean Architecture
การ Deploy Application ขึ้น GCP
พื้นฐานภาษา Go
SOLID Principles
Domain Driven Design (DDD)
การทำ Mock และ Unit testing ใน Go
Course content
24 sections • 115 lectures • 13h 1m total length
Expand all sections
แนะนำ Course
1 lecture • 9min


IT & Software › Other IT & Software › Microservices
เริ่มต้นสร้าง Microservices ด้วย Golang จาก Zero สู่ Hero
เรียนรู้แบบ Step by Step ในการสร้าง Microservices Application ด้วยภาษา Golang ด้วยการออกแบบจริง ลองทำจริง Deploy จริง
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What you'll learn
มีความเข้าใจใน Microservices Architecture เบื้องต้น
สามารถสร้าง Microservices Application ด้วยภาษา Golang ได้
สามารถ Deploy Microservices Application เบื้องต้นด้วยตัวเองได้
สามารถออกแบบ Microservices ได้ในรูปแบบของ Domain Driven Design
สามารถใช้งานเครื่องมือที่นิยมใช้ใน Microservices ได้ เช่น Kubernetes, Kafka, gRPC, ...
Course content
19 sections • 128 lectures • 21h 1m total length
Expand all sections

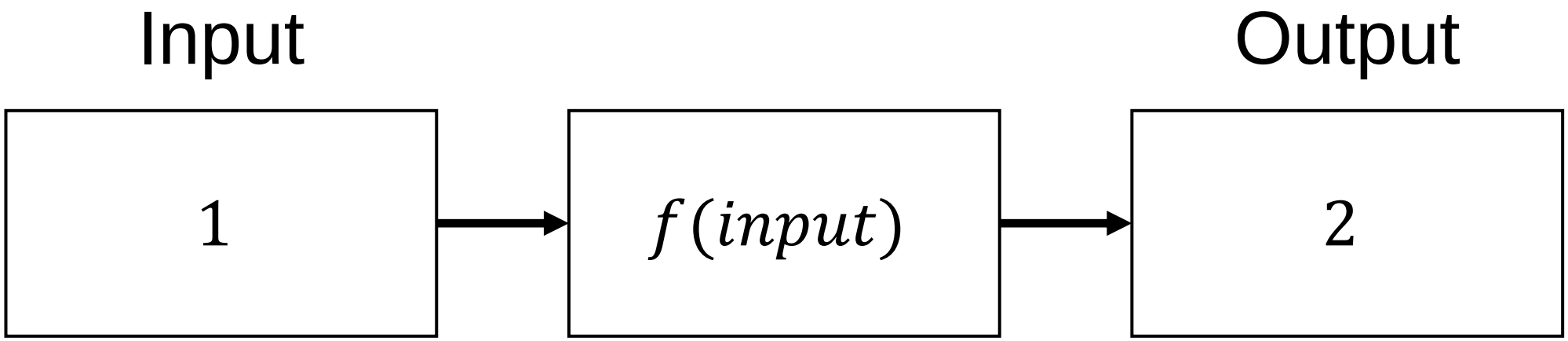
What is AI ???

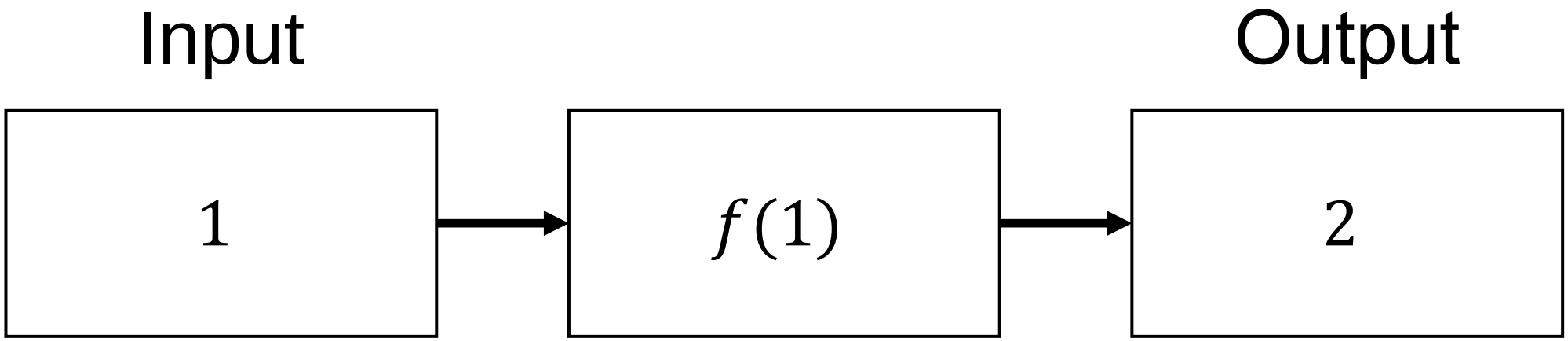
An magic 🧙‍♂️ of **mathematics**.

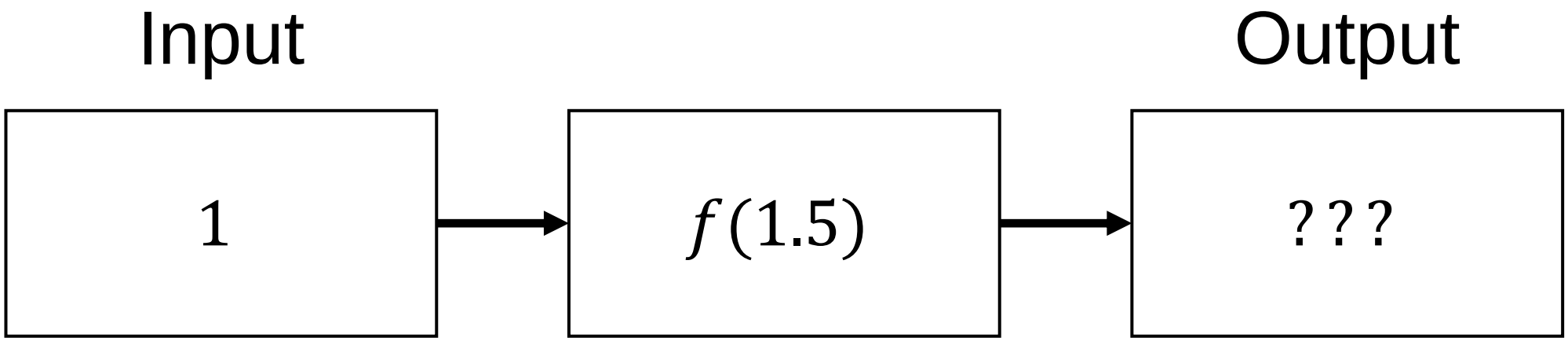
Let’s say, you have data like this.

X	Y
0	0
1	2
2	4
3	6

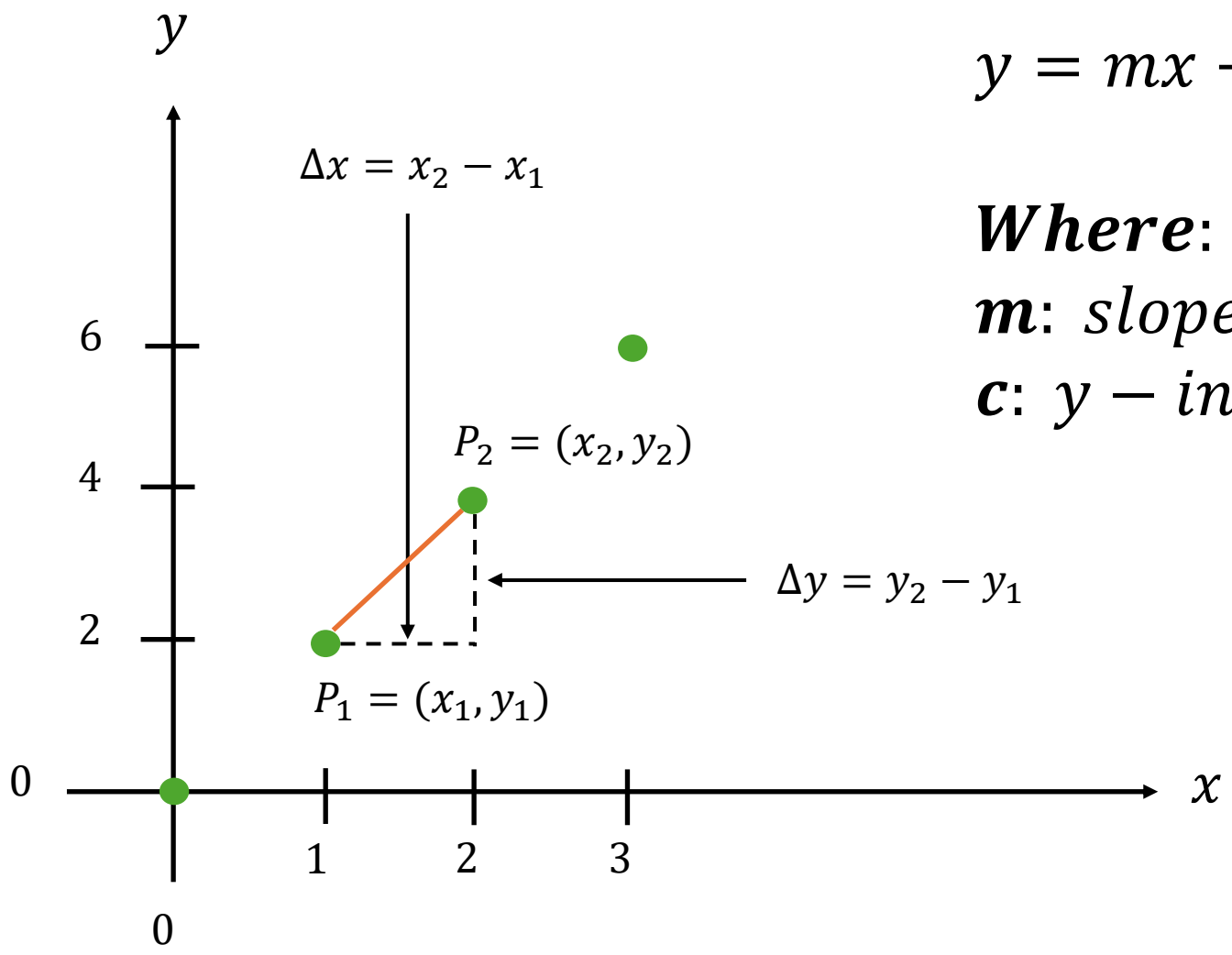

Input
Output
1
Some WTF Process
2


Input
Output
1
$f(input)$
2


Input
Output
1
$f(1)$
2



Can you approximate this
function ???

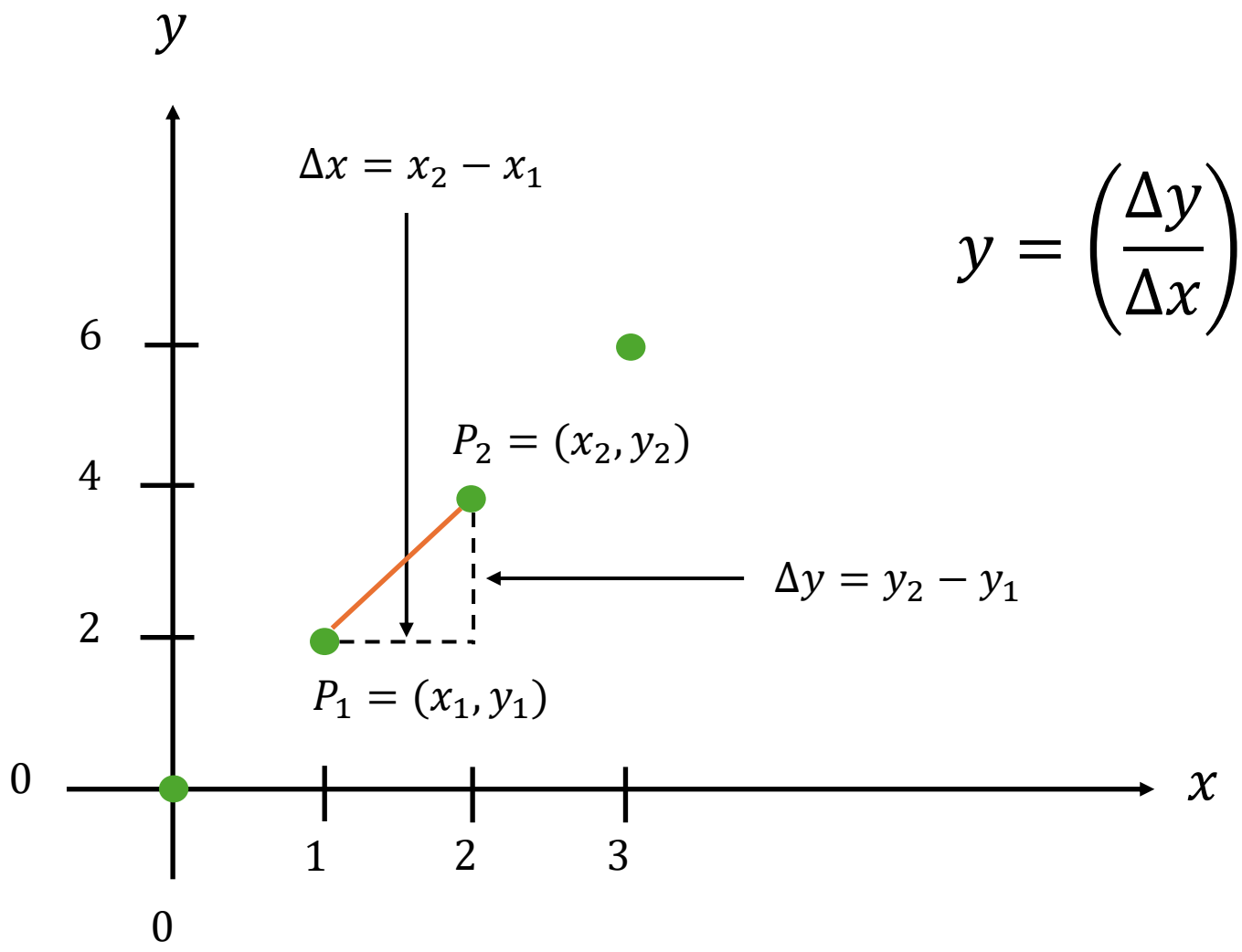


$$y = mx + c$$

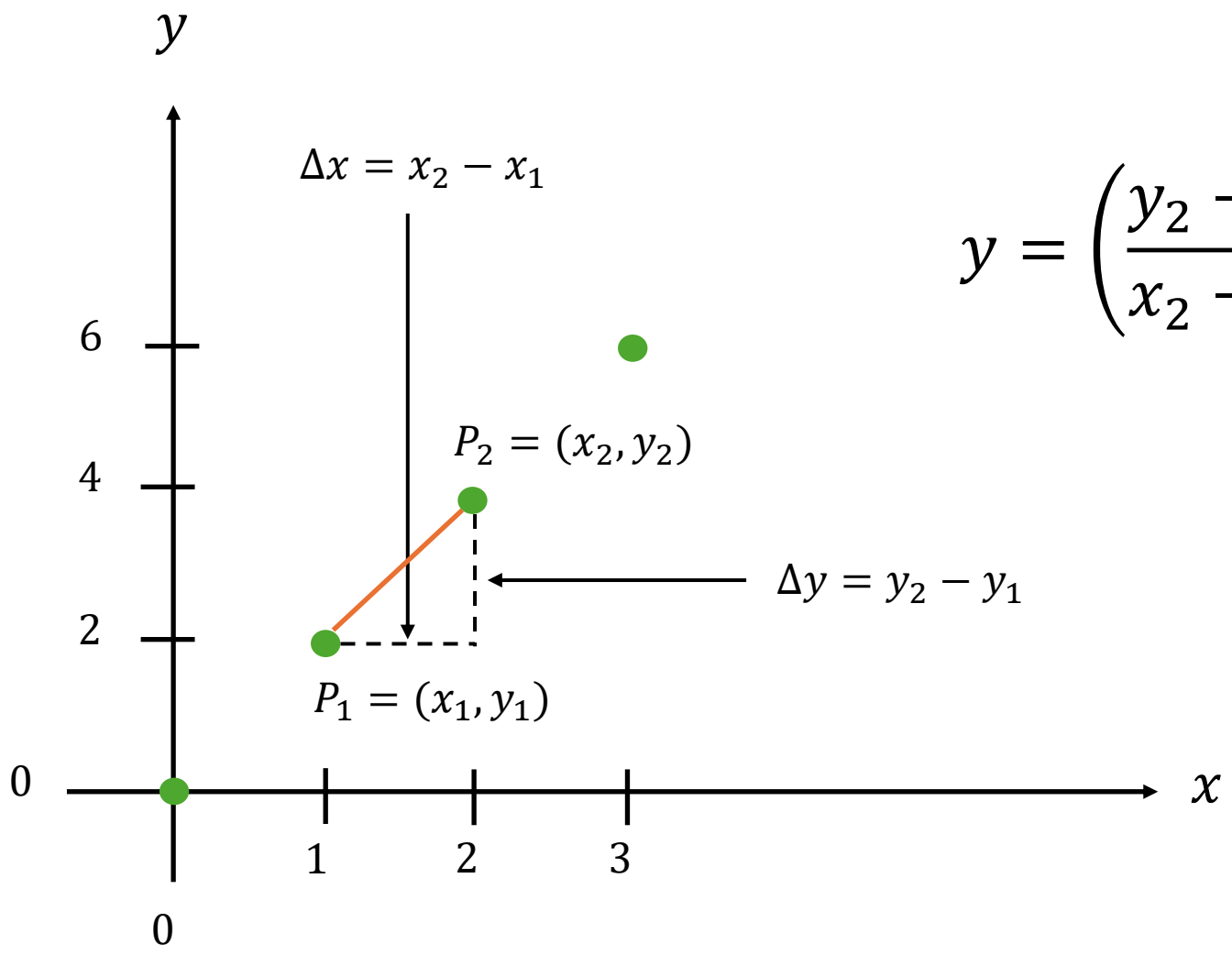
Where:

m: *slope*;

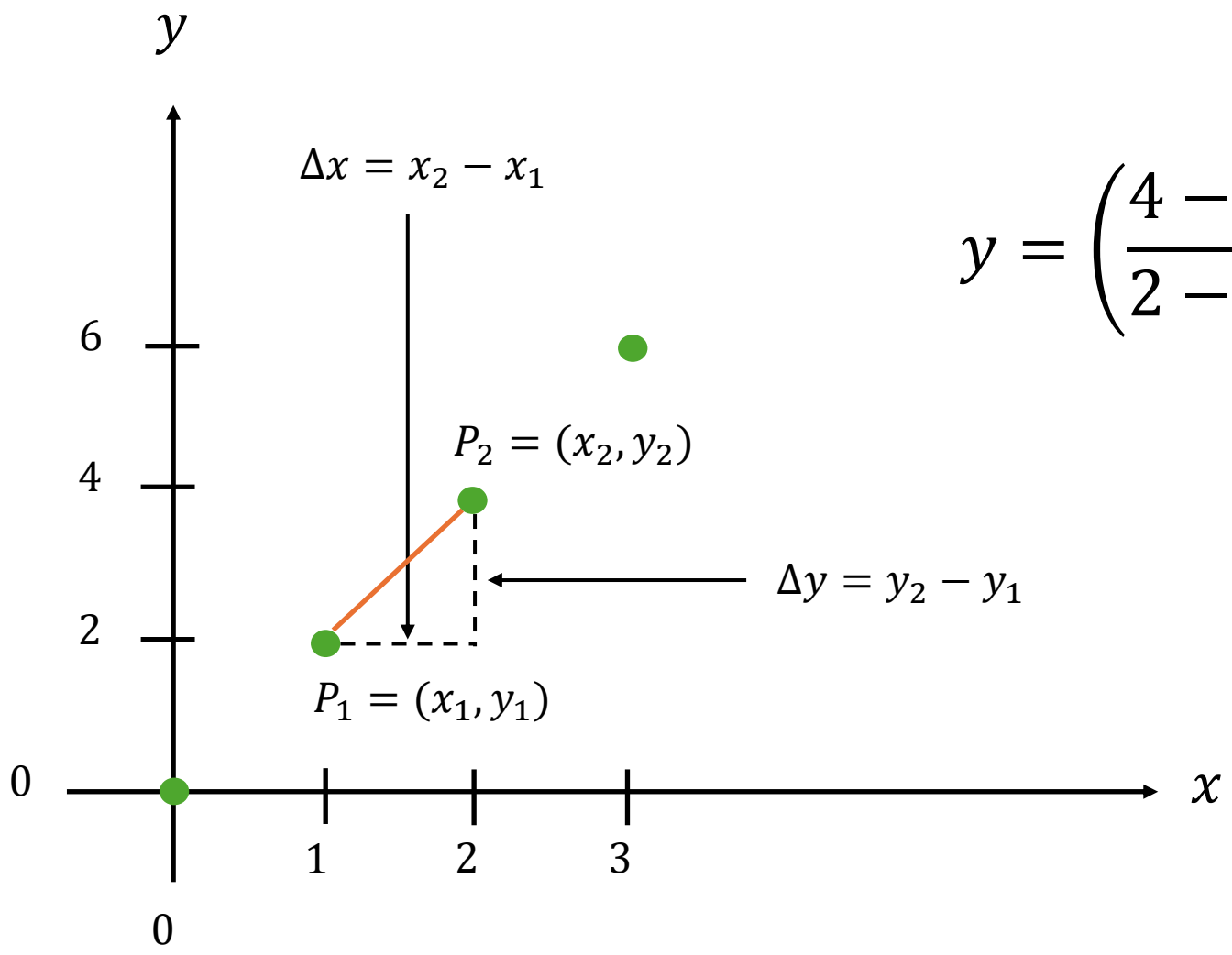
c: $y - intercept$;



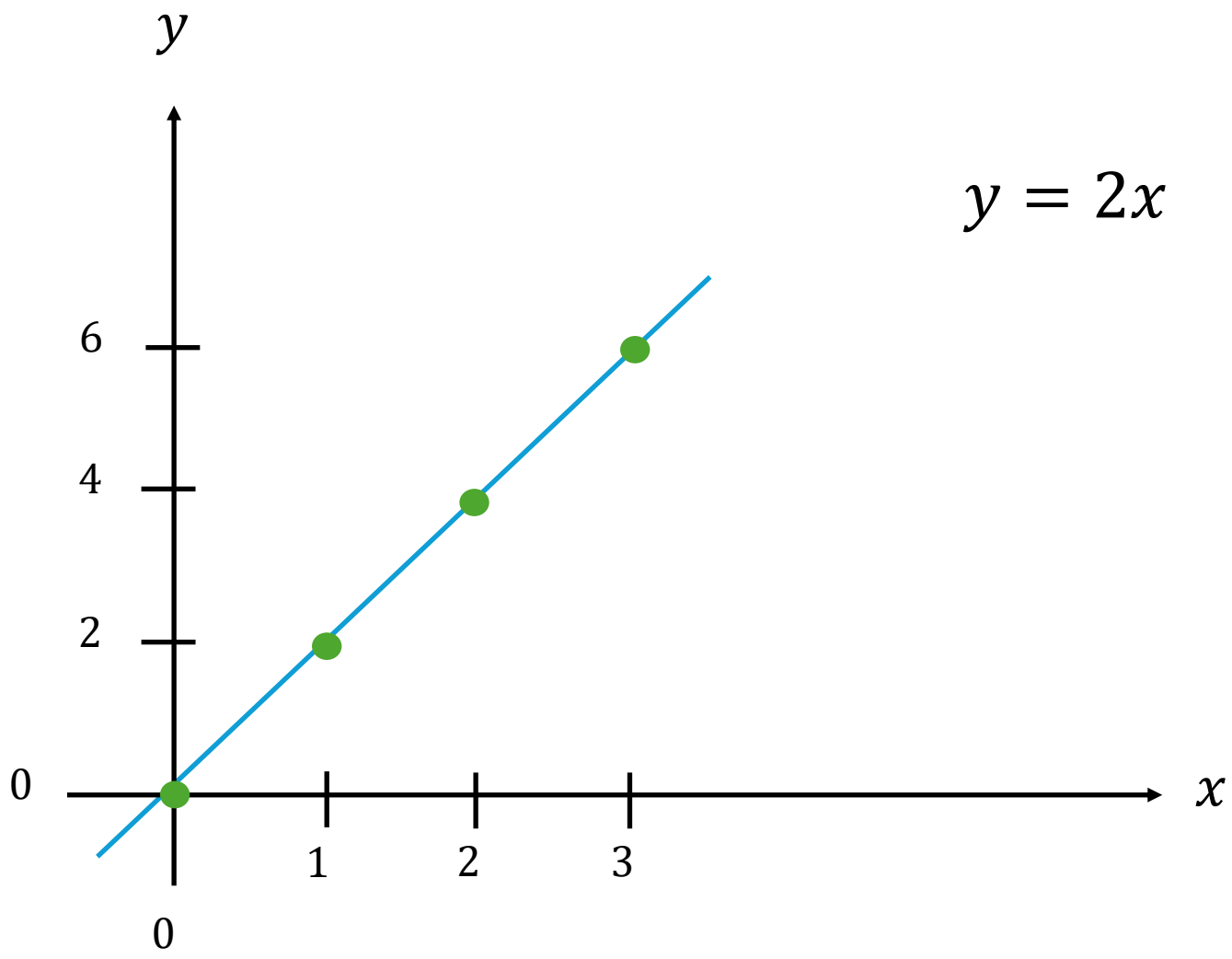
$$y = \left(\frac{\Delta y}{\Delta x}\right) x + 0$$



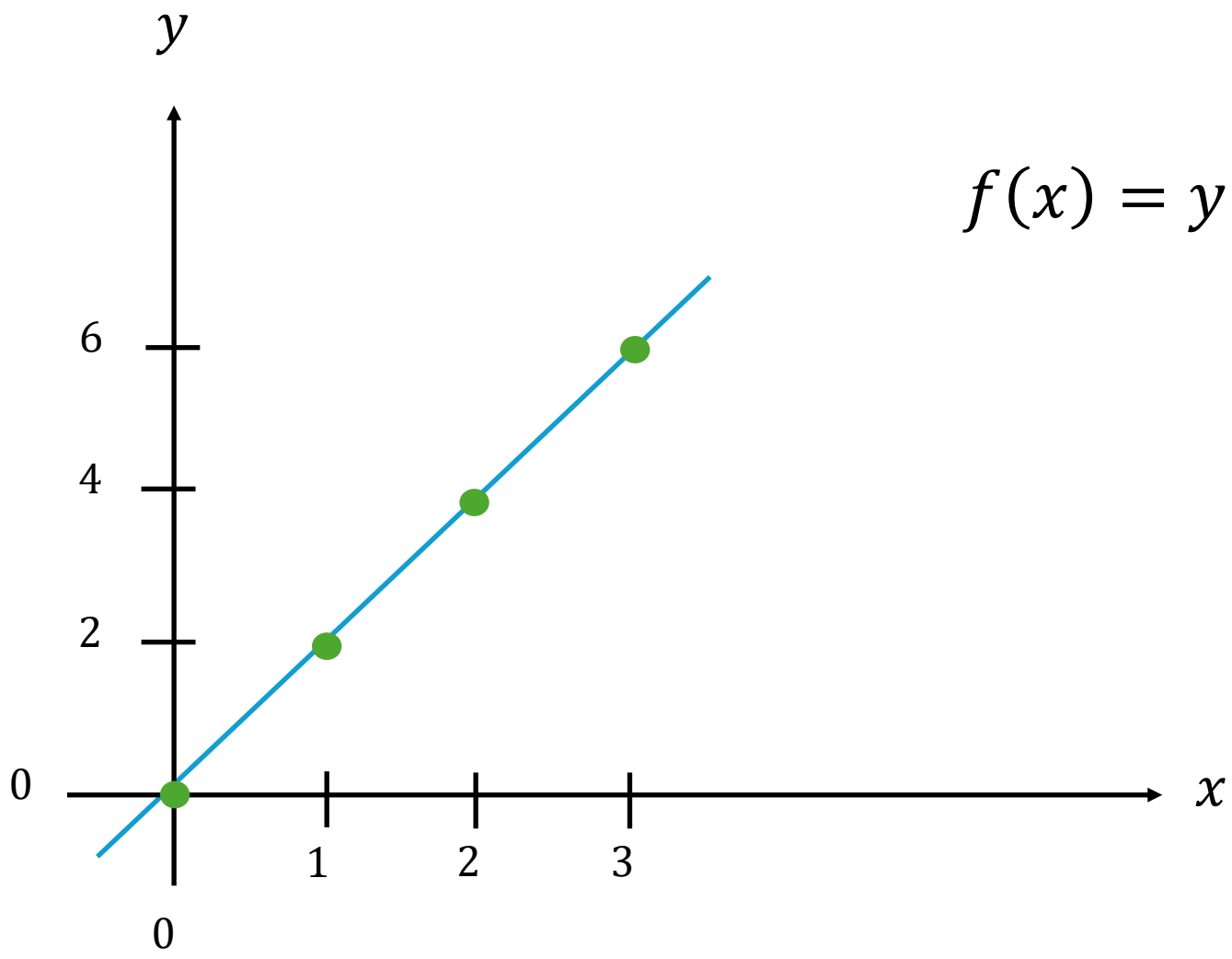
$$y = \left(\frac{y_2 - y_1}{x_2 - x_1}\right) x$$



$$y = \left(\frac{4-2}{2-1}\right)x$$



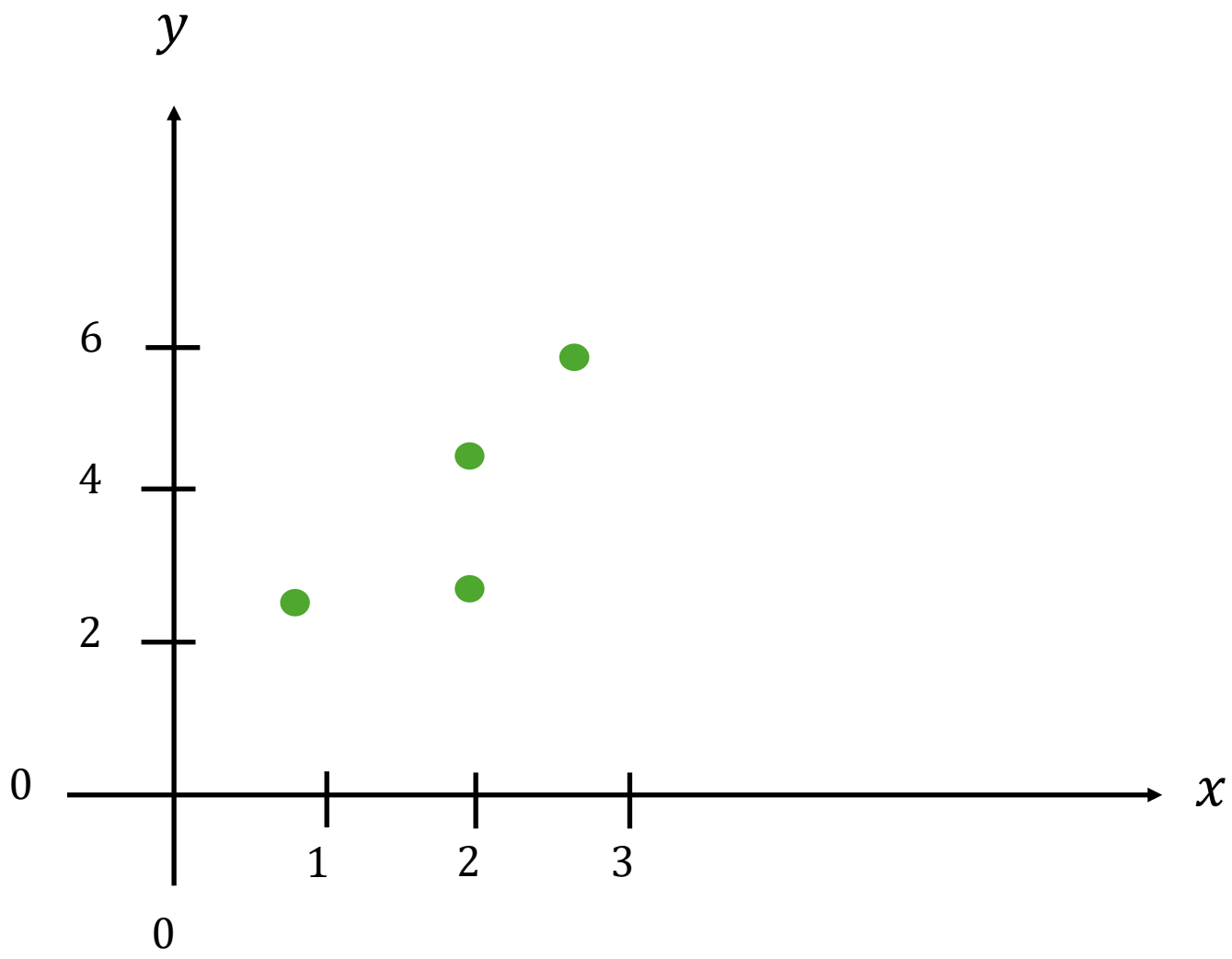
$y = 2x$

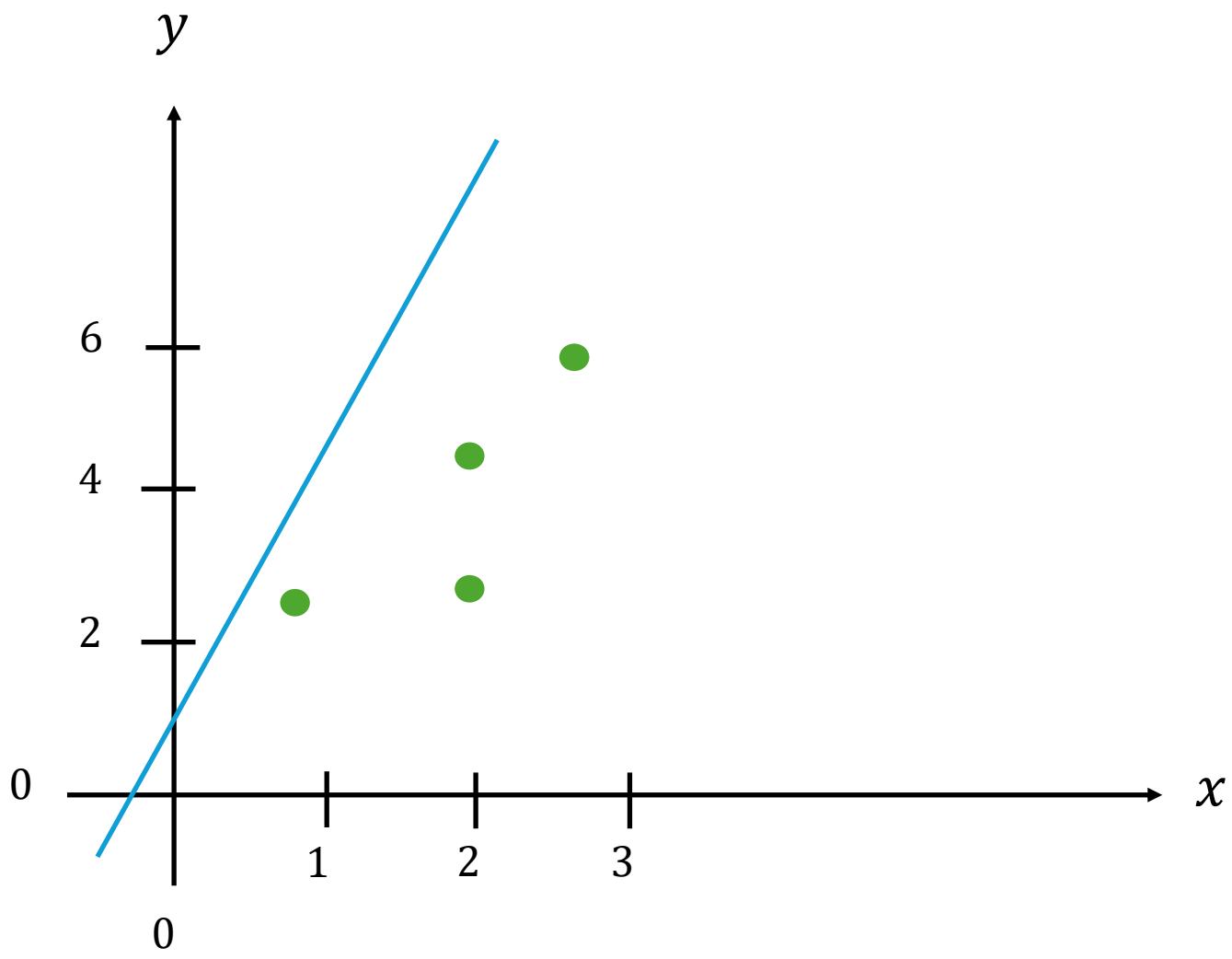


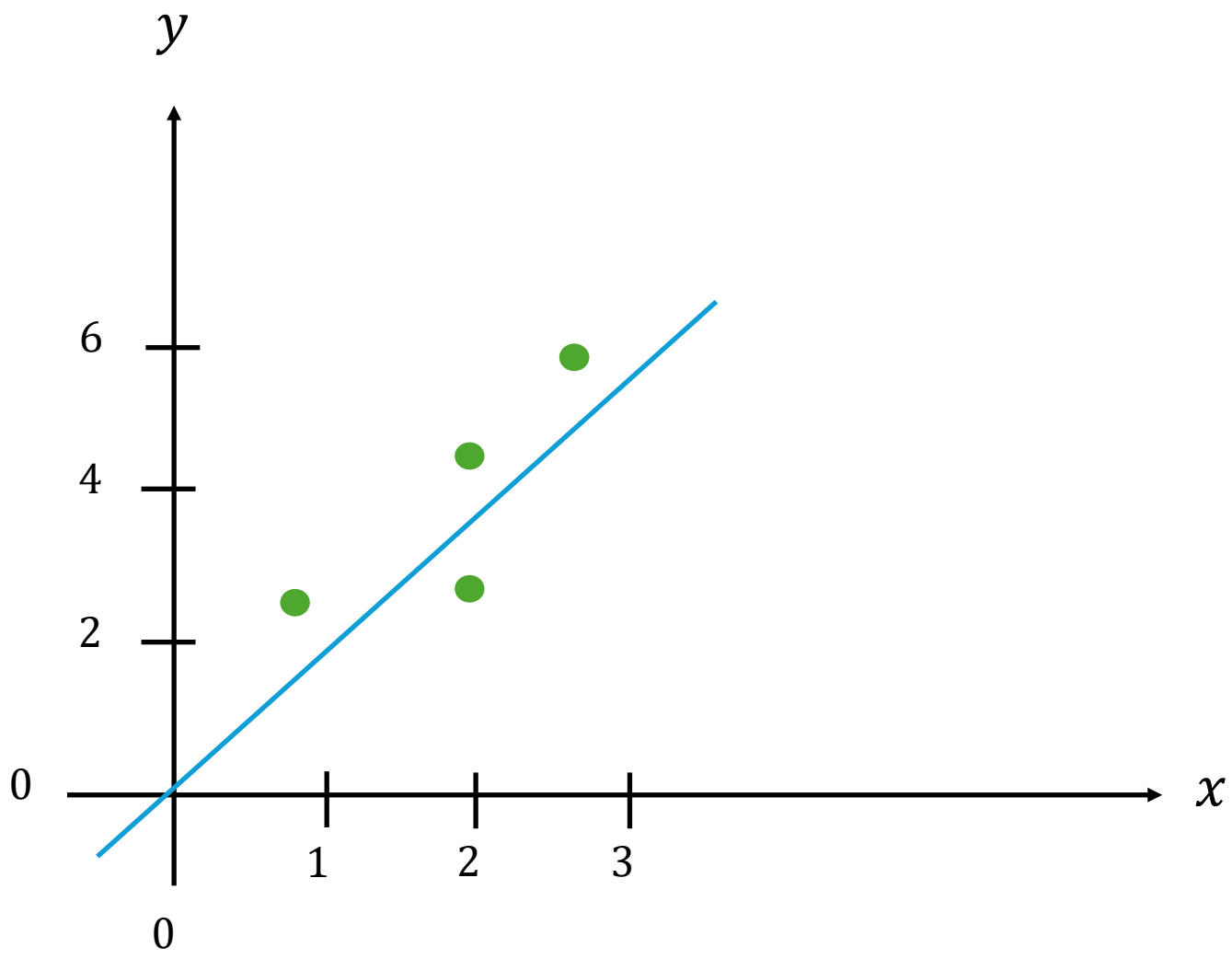
$$f(x) = y = 2x$$

x	$f(x) = 2x$	$f(x)$
0	$f(0) = 2(0)$	0
1	$f(1) = 2(1)$	2
2	$f(2) = 2(2)$	4
3	$f(3) = 2(3)$	6

But, what if data are look like this ???

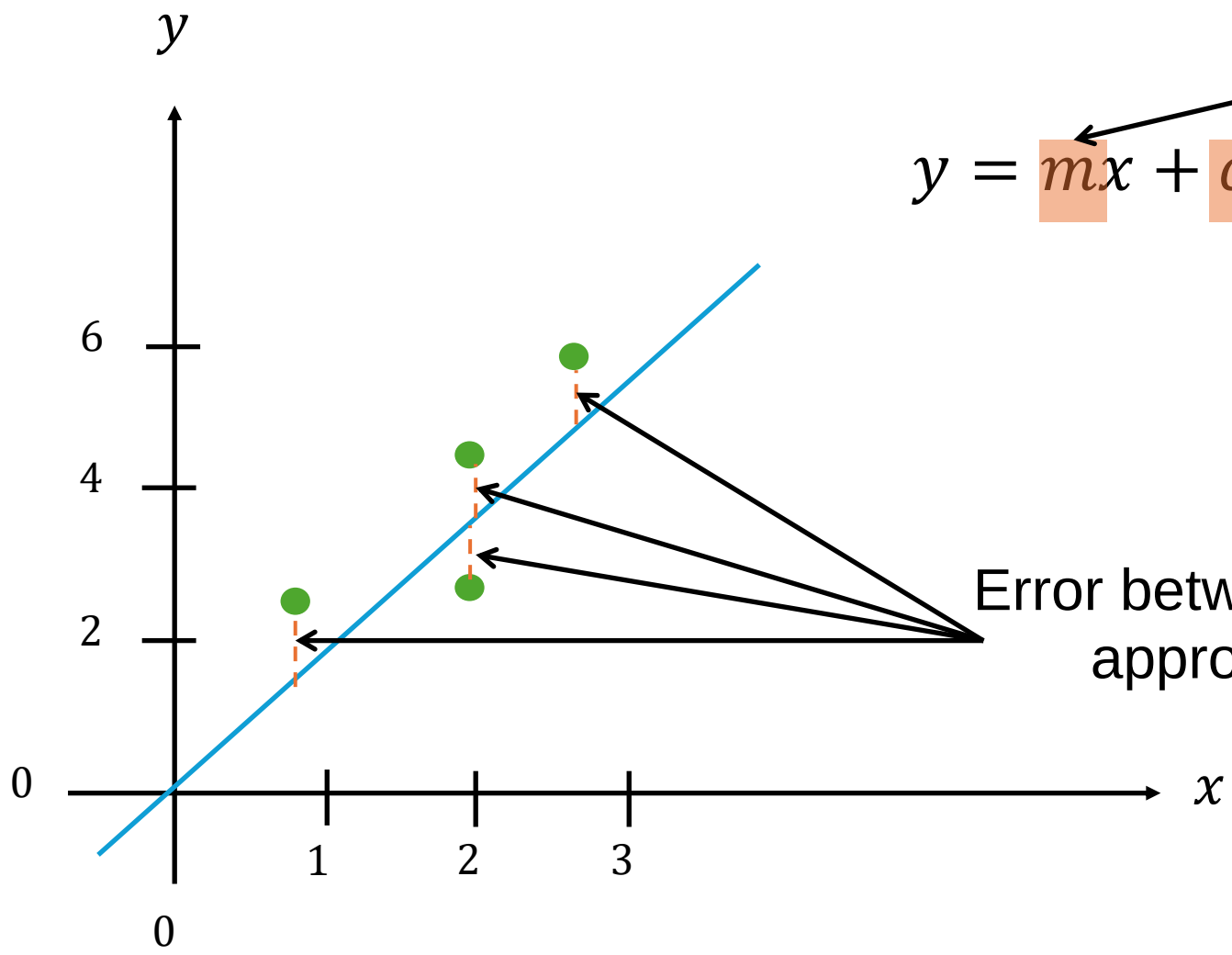

y
6
4
2
0
0
1
2
3
x


y
6
4
2
0
0
1
2
3
x

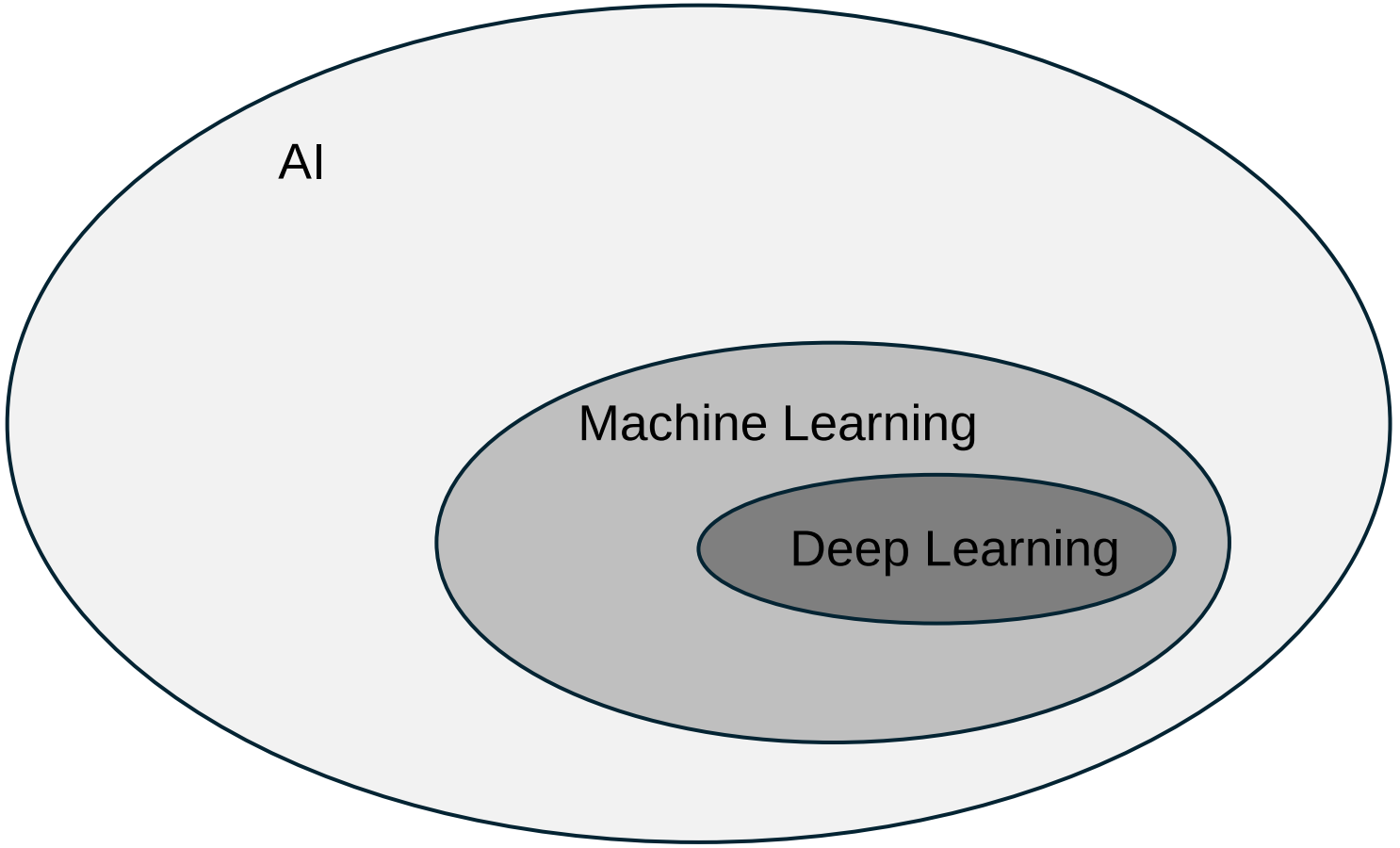

y
6
4
2
0
0
1
2
3
x

Use AI to find this.

$y = mx + c$

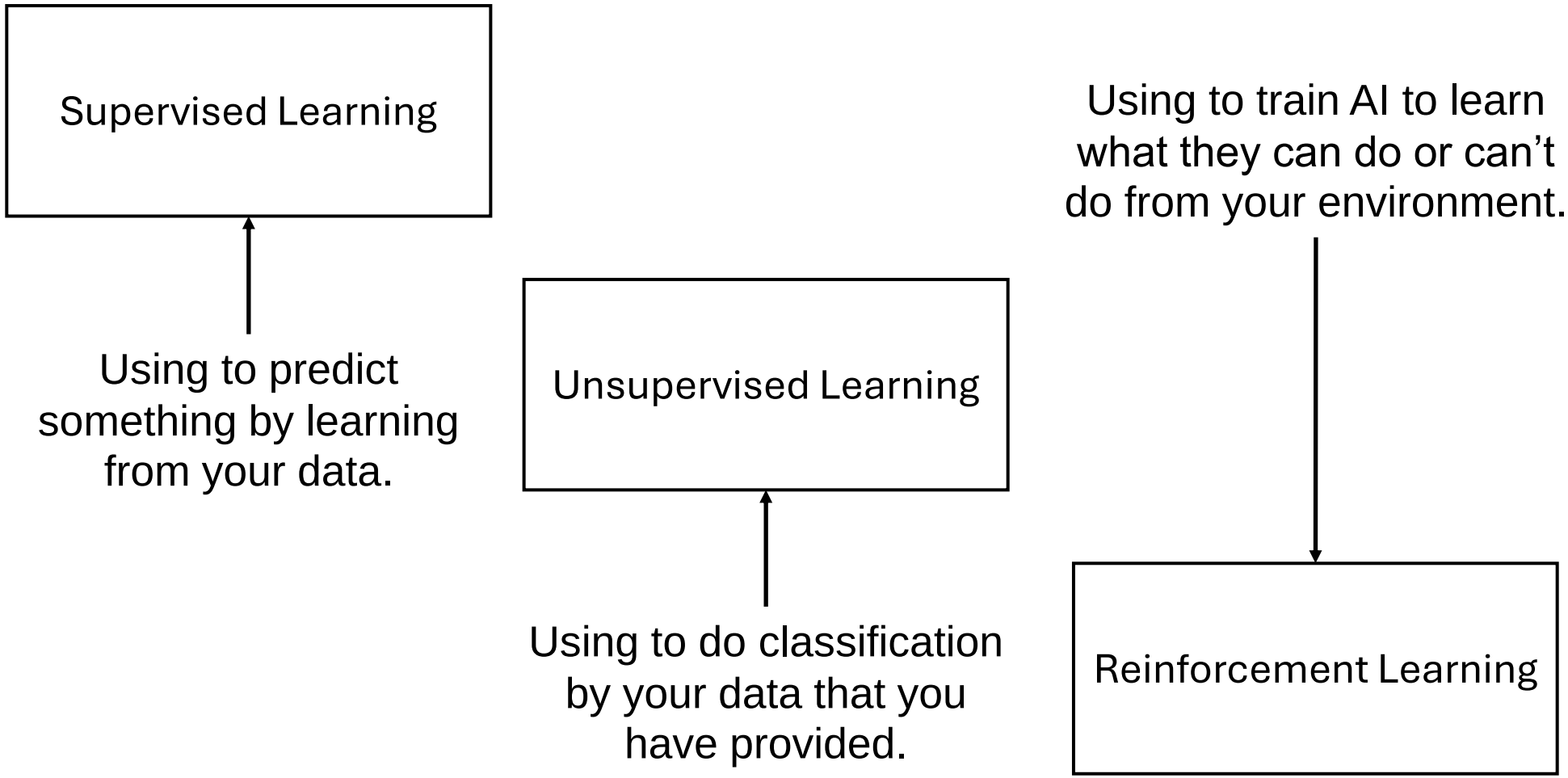


Error between real data and approximation line.

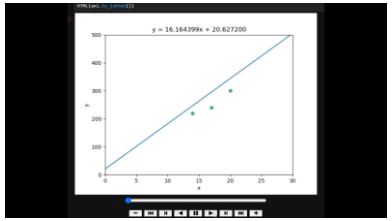


In my opinion, no need to care about this picture too much. That’s enough to call that AI by its model name.

Types of AI


Supervised Learning
Using to predict something by learning from your data.
Unsupervised Learning
Using to do classification by your data that you have provided.
Using to train AI to learn what they can do or can’t do from your environment.
Reinforcement Learning

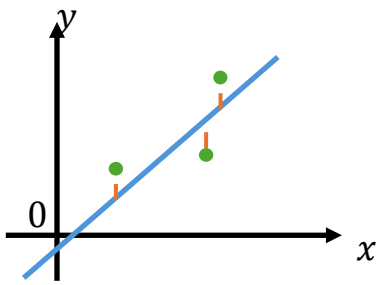
General Steps for AI

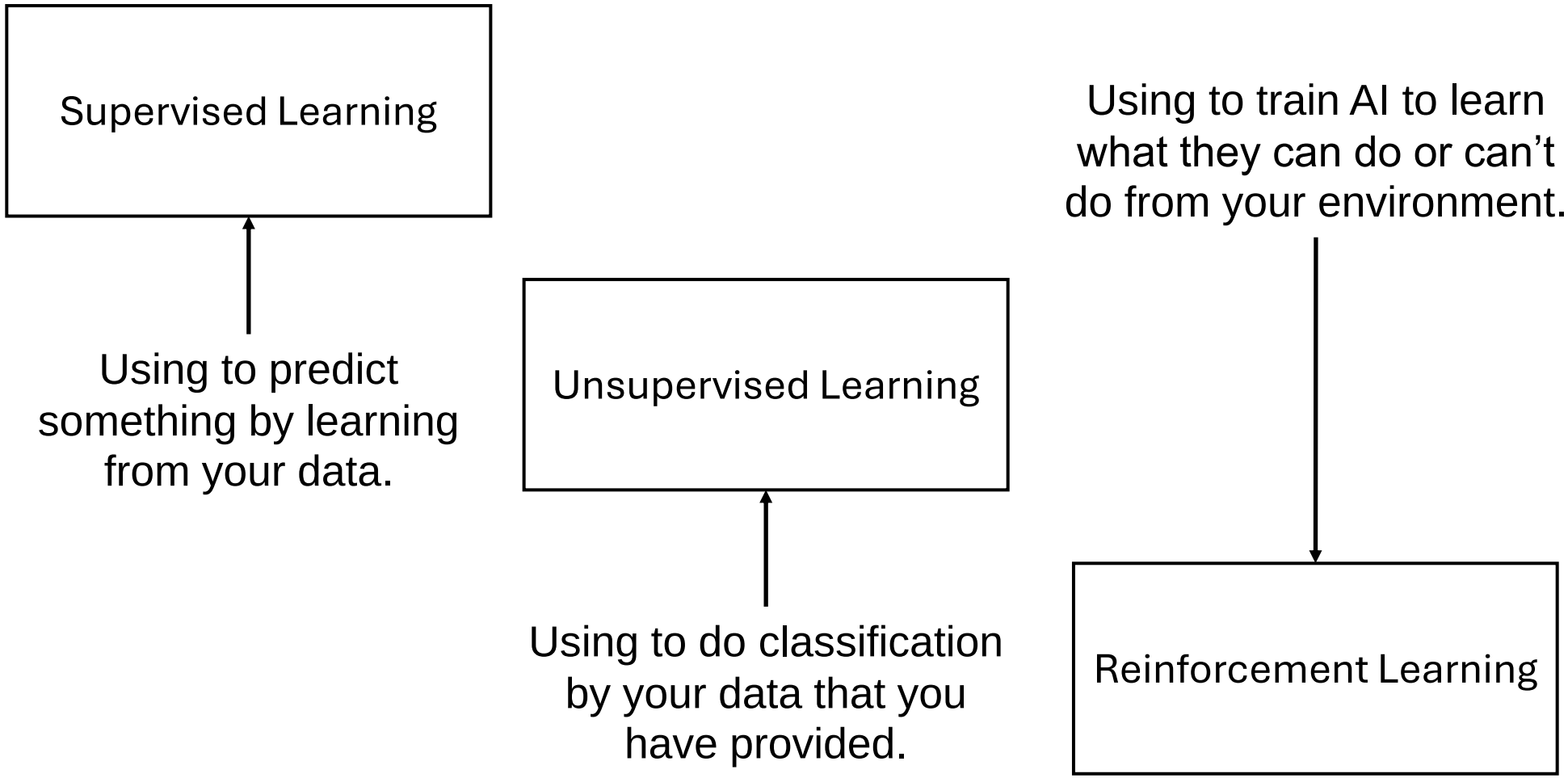


$f(2) = 4\,???$

Collecting Data → Choosing the Model → Train Model by Your Data → Test the accuracy of your model

X	Y
0	0
1	2
2	4
3	6

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Reinforcement Learning

Supervised Learning

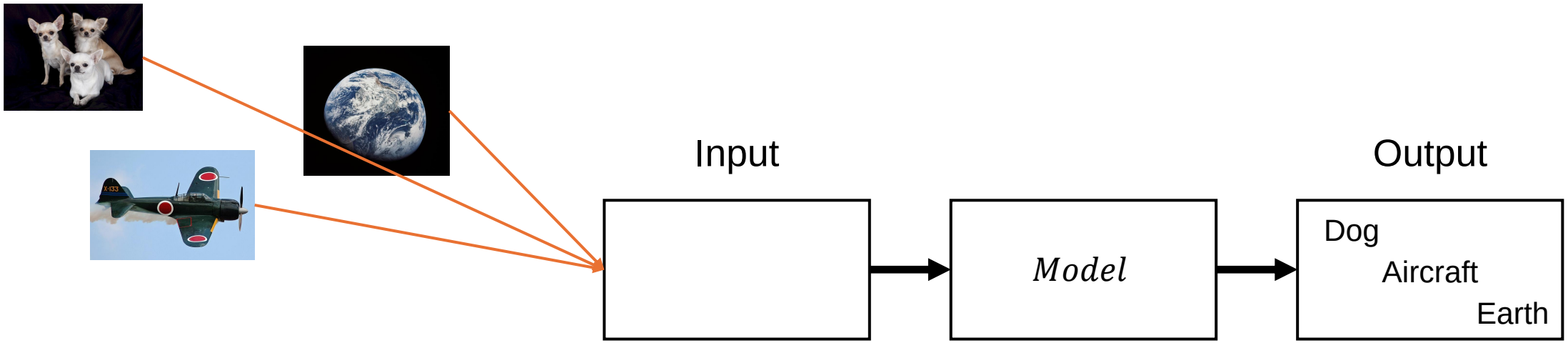
Supervised Learning

Dog

Aircraft

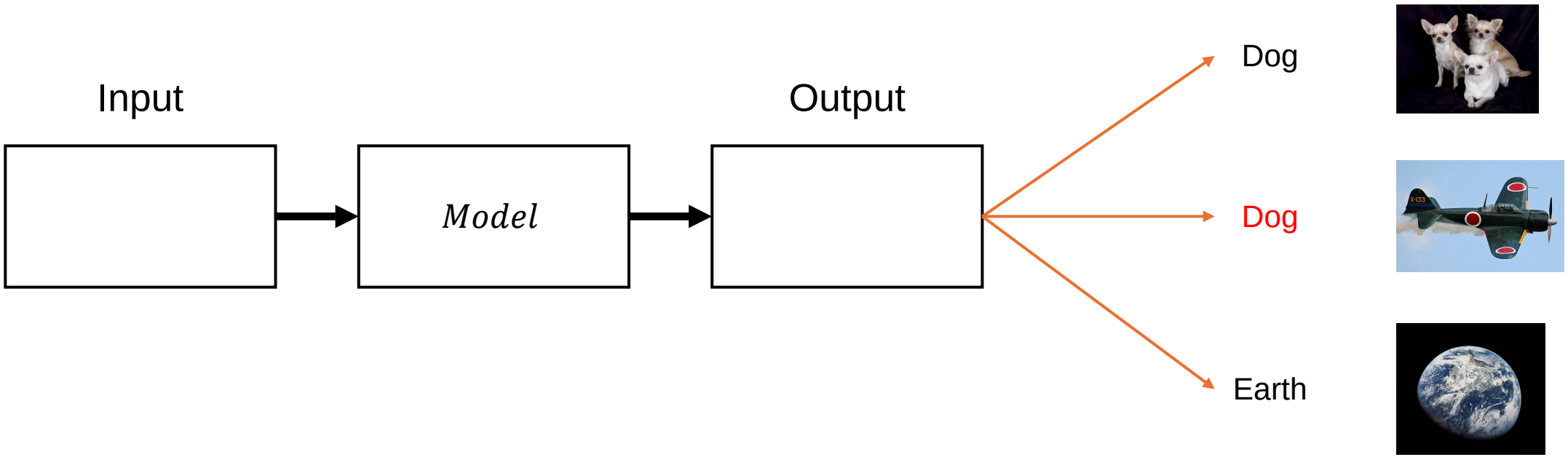
Earth

Supervised Learning



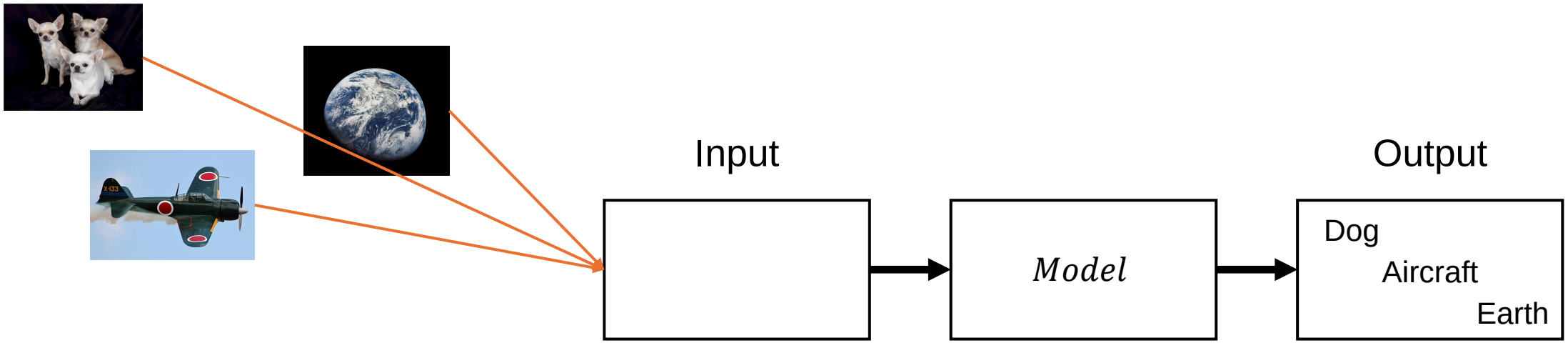
Epoch: 1

Supervised Learning



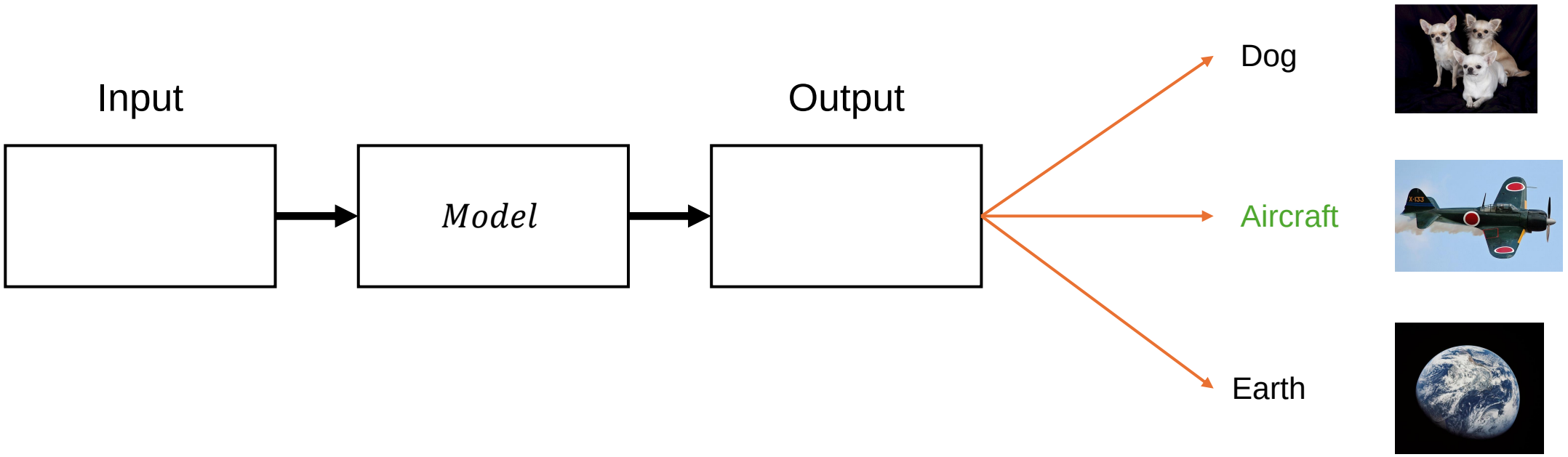
Epoch: 1

Supervised Learning



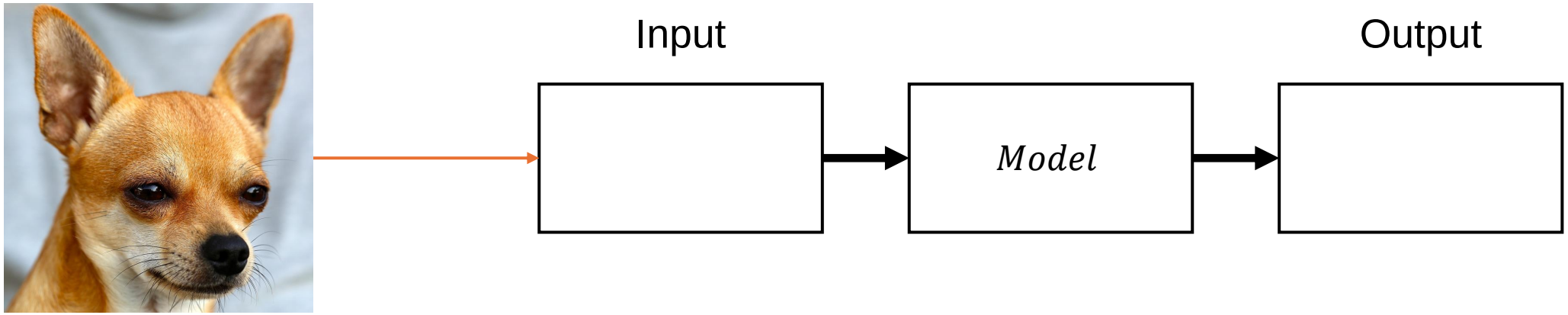
Epoch: n

Supervised Learning

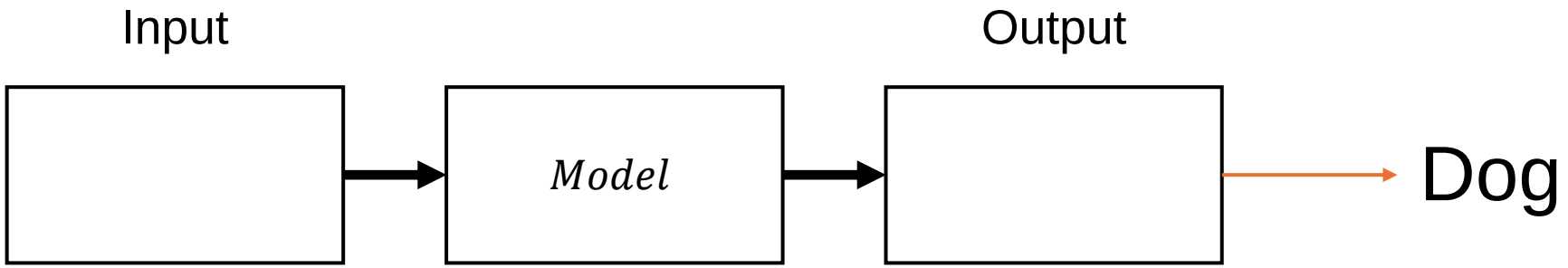


Epoch: n

Supervised Learning



Supervised Learning

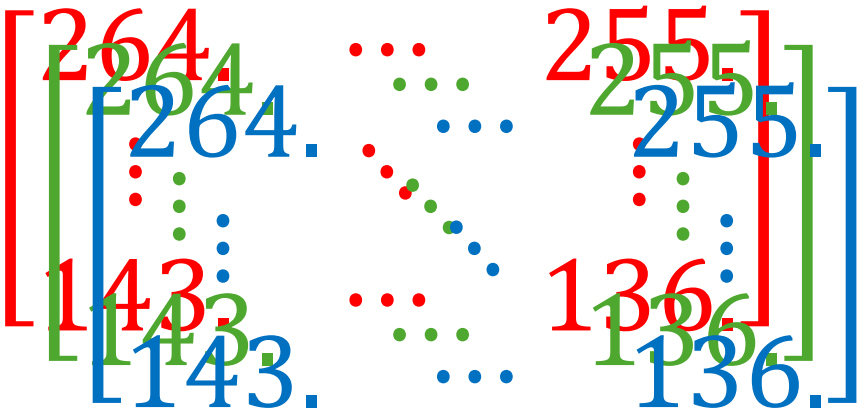


How AI can read our picture ???

Supervised Learning

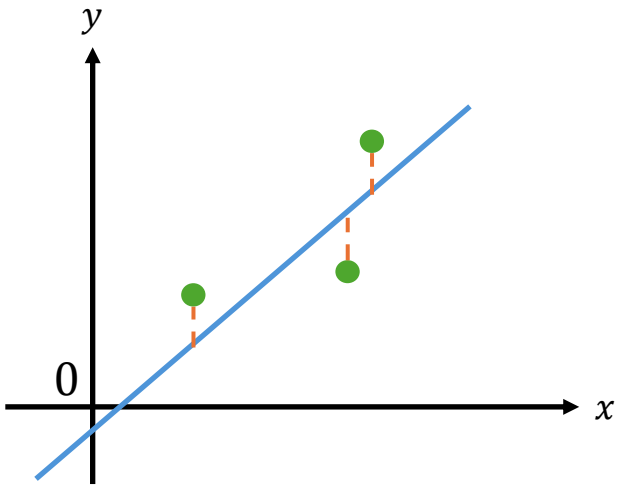
Supervised Learning

Transform to Matrix

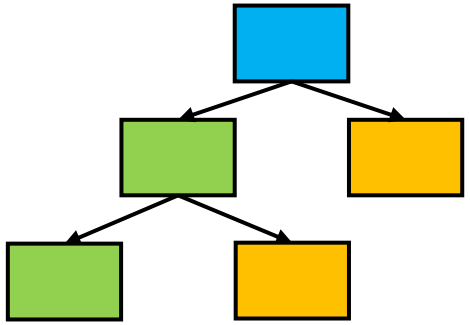


Example Model

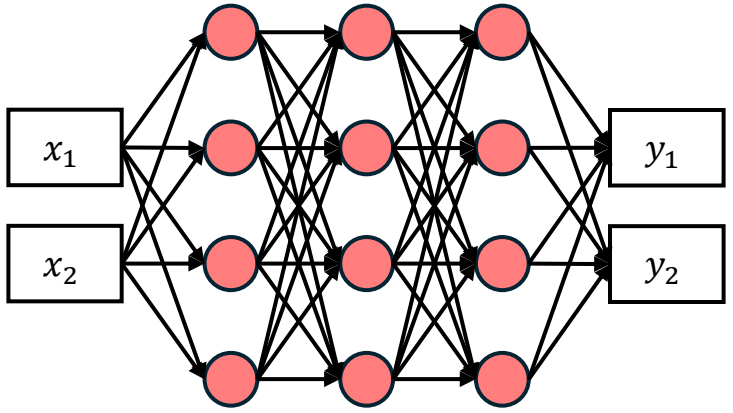
Linear Regression

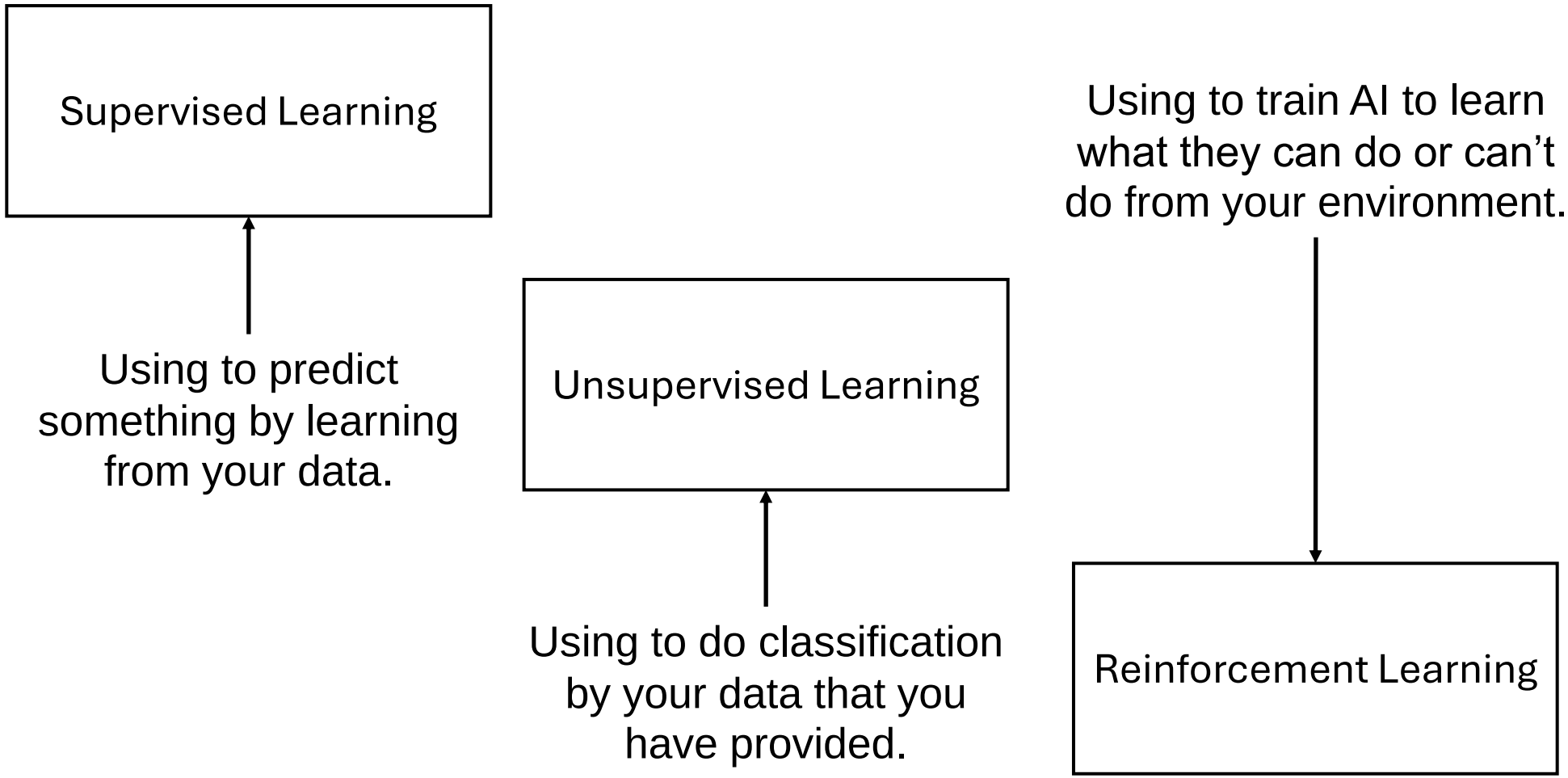


Decision Tree



Deep Learning

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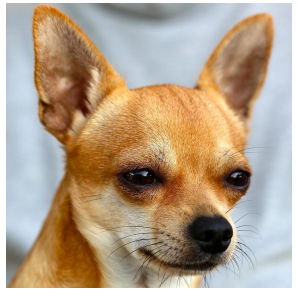
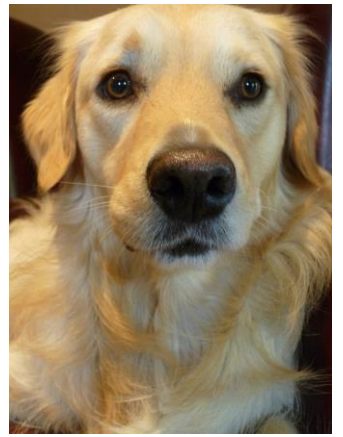
Reinforcement Learning

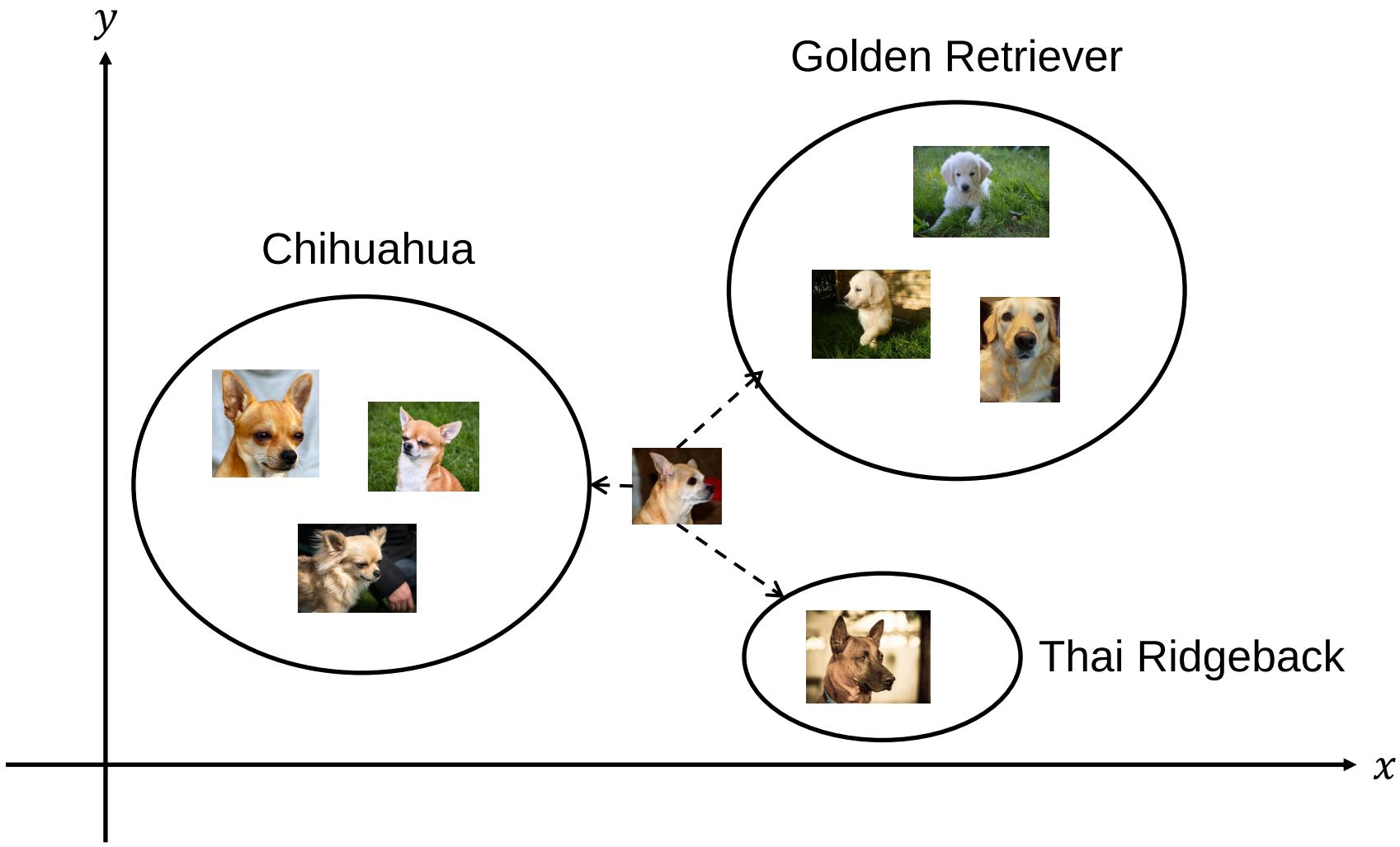
Unsupervised Learning

Unsupervised Learning

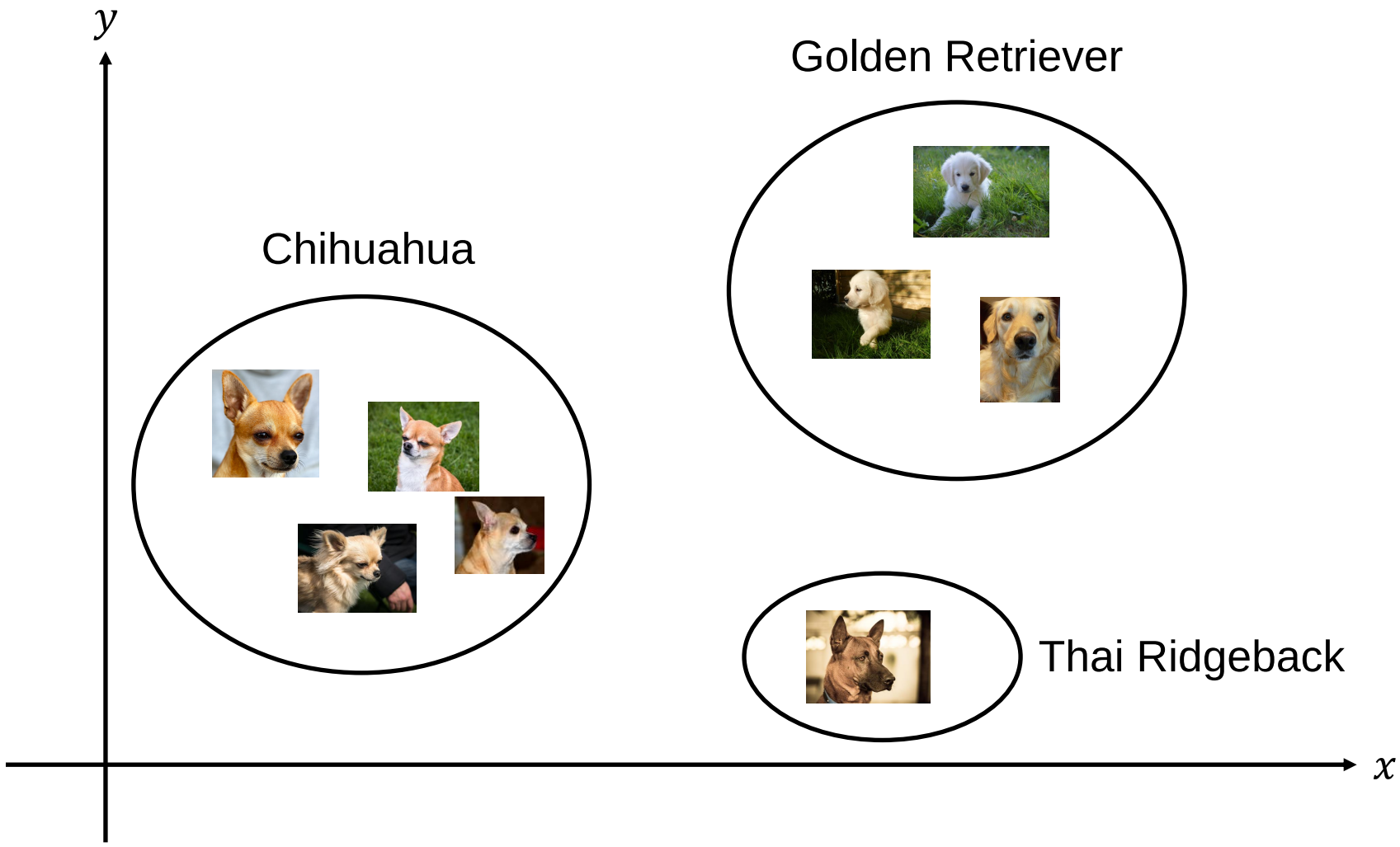




Unsupervised Learning

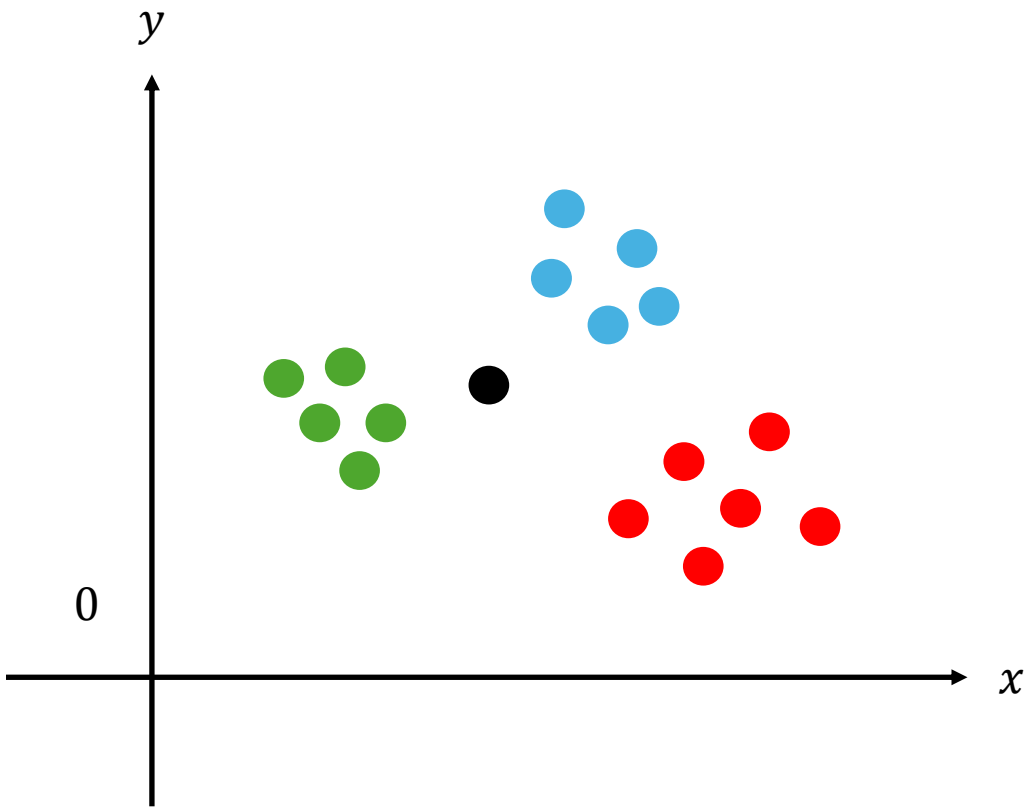


Unsupervised Learning

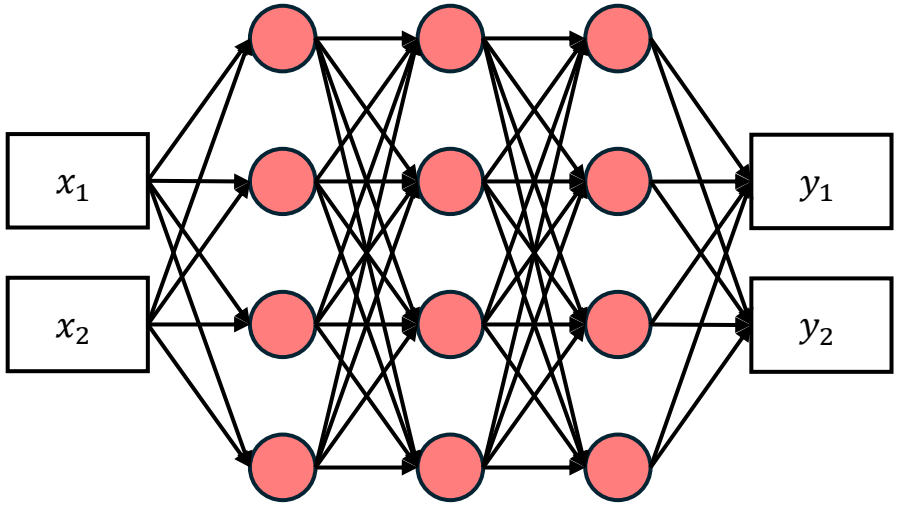


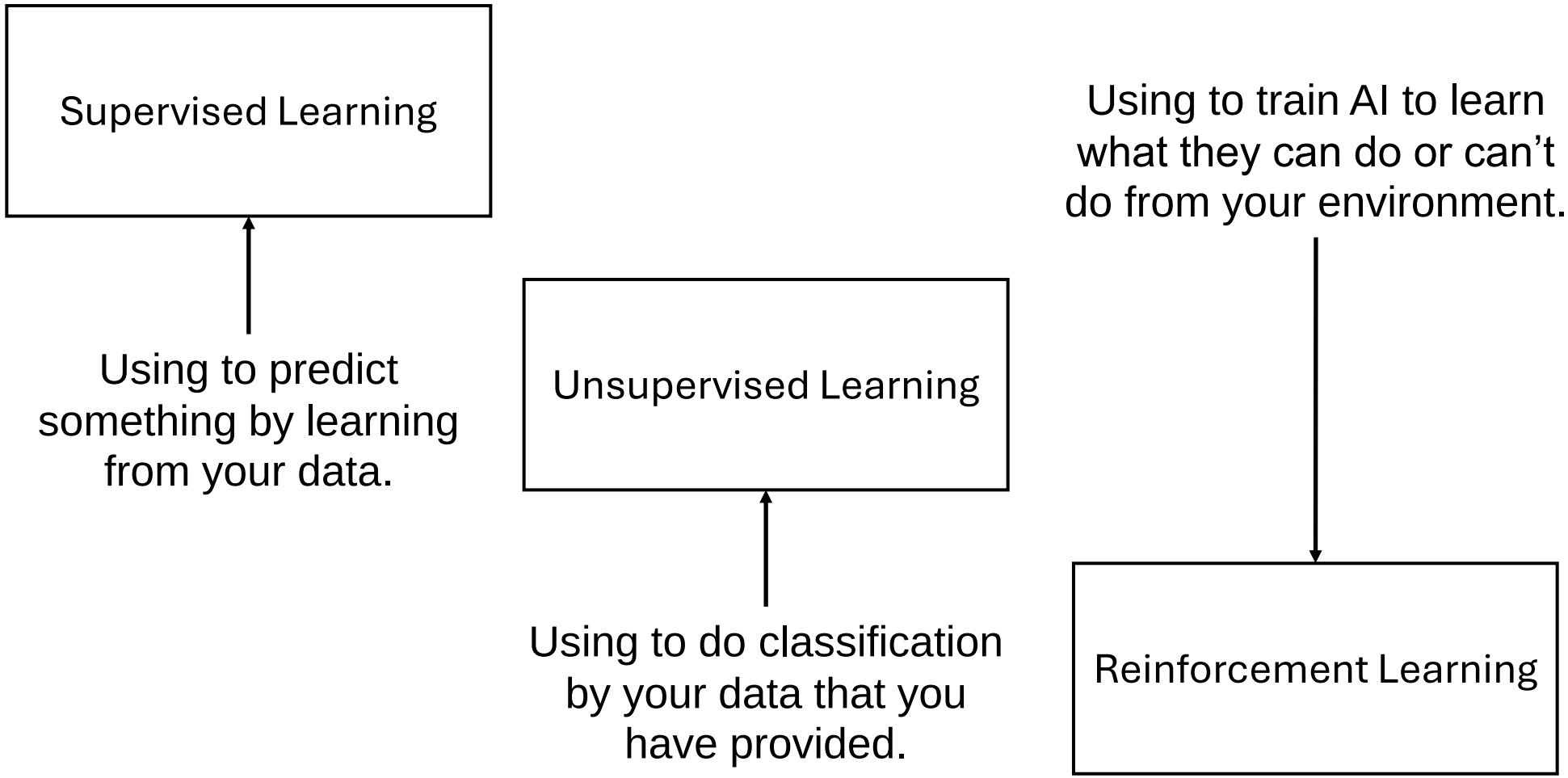
Example Model

K-Means Clustering



Deep Learning

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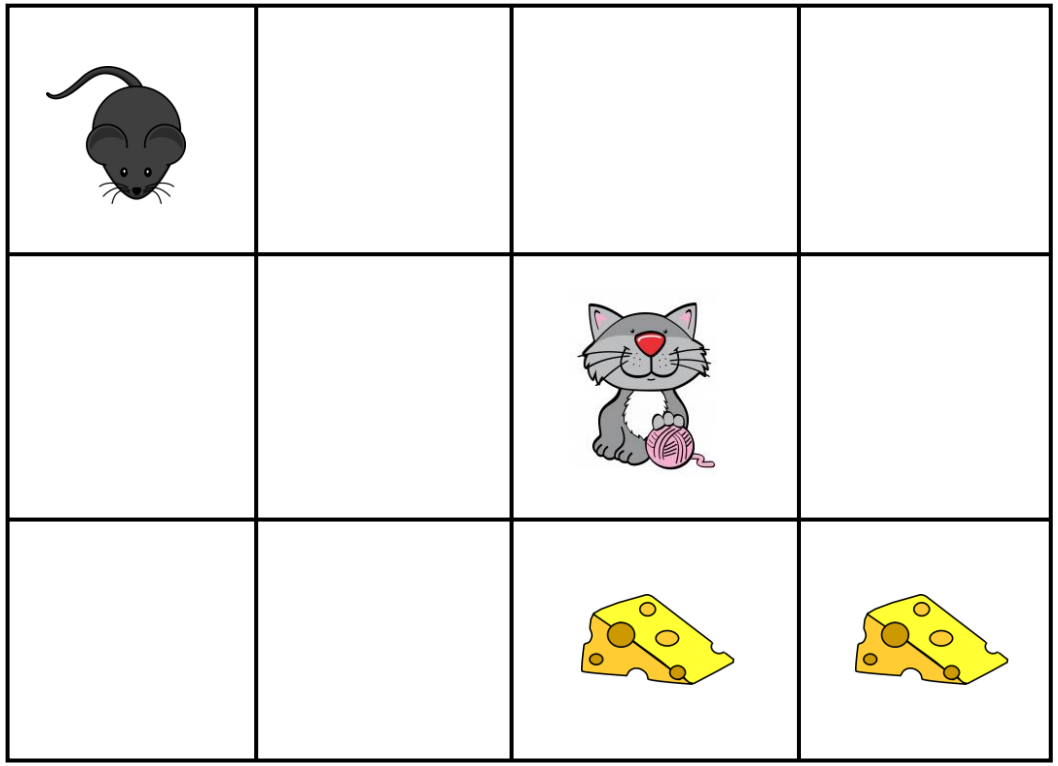
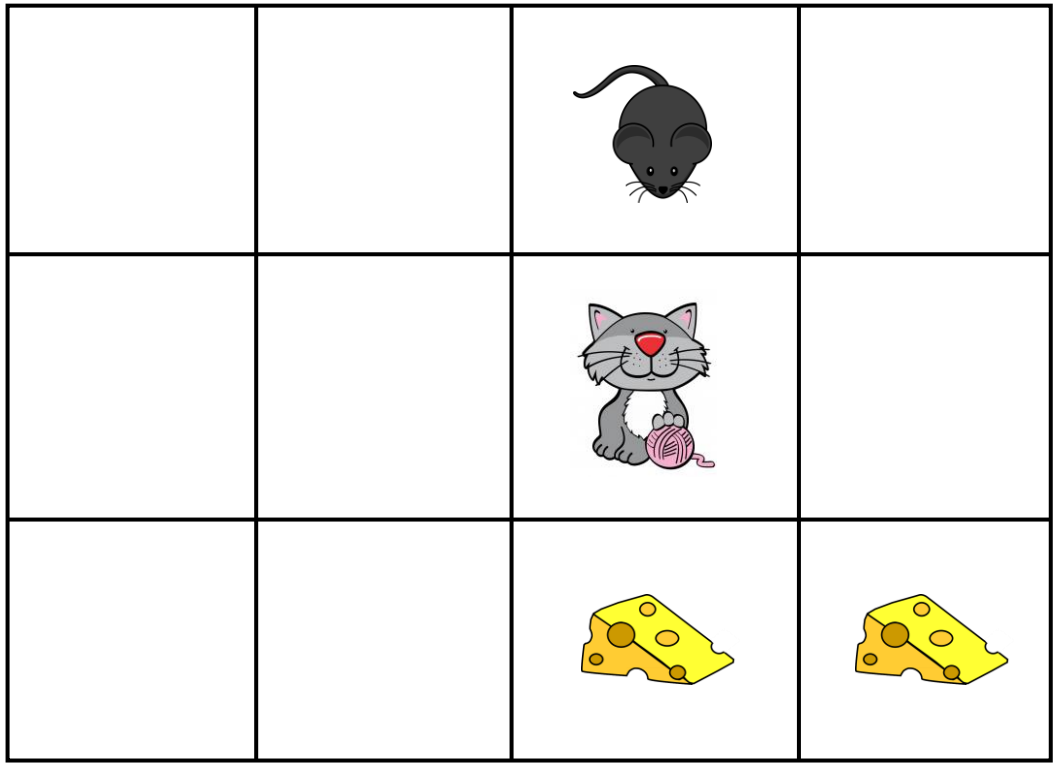
Reinforcement Learning

Reinforcement Learning

Reinforcement Learning

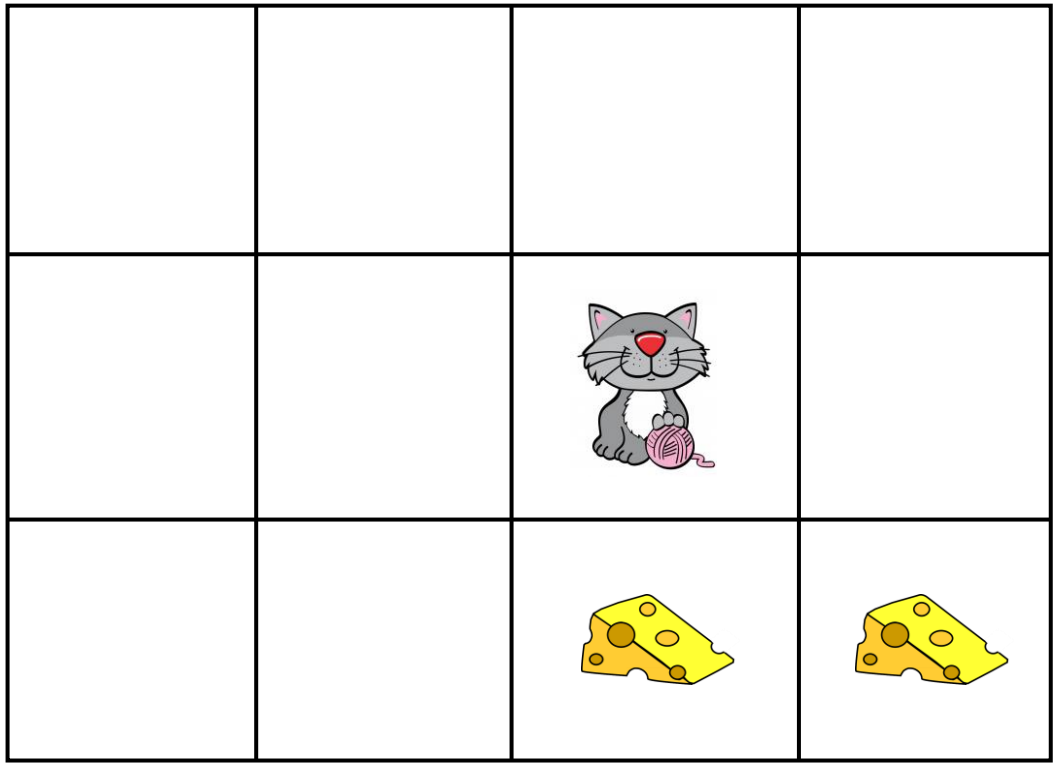


Reinforcement Learning

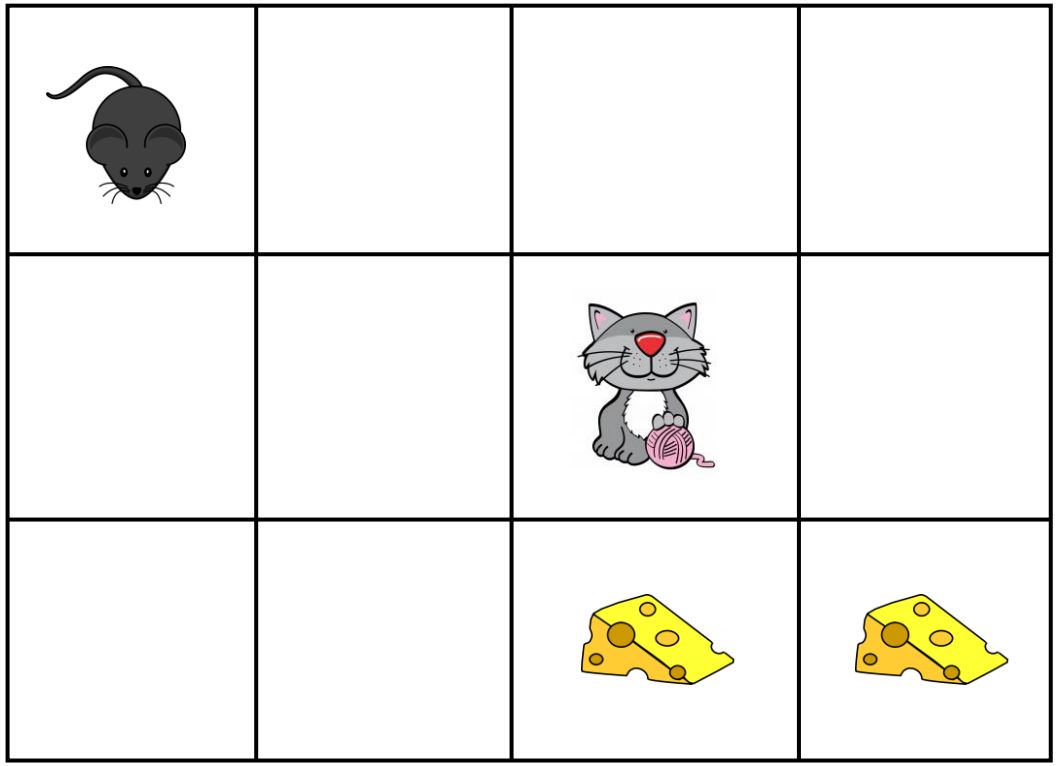


Reinforcement Learning

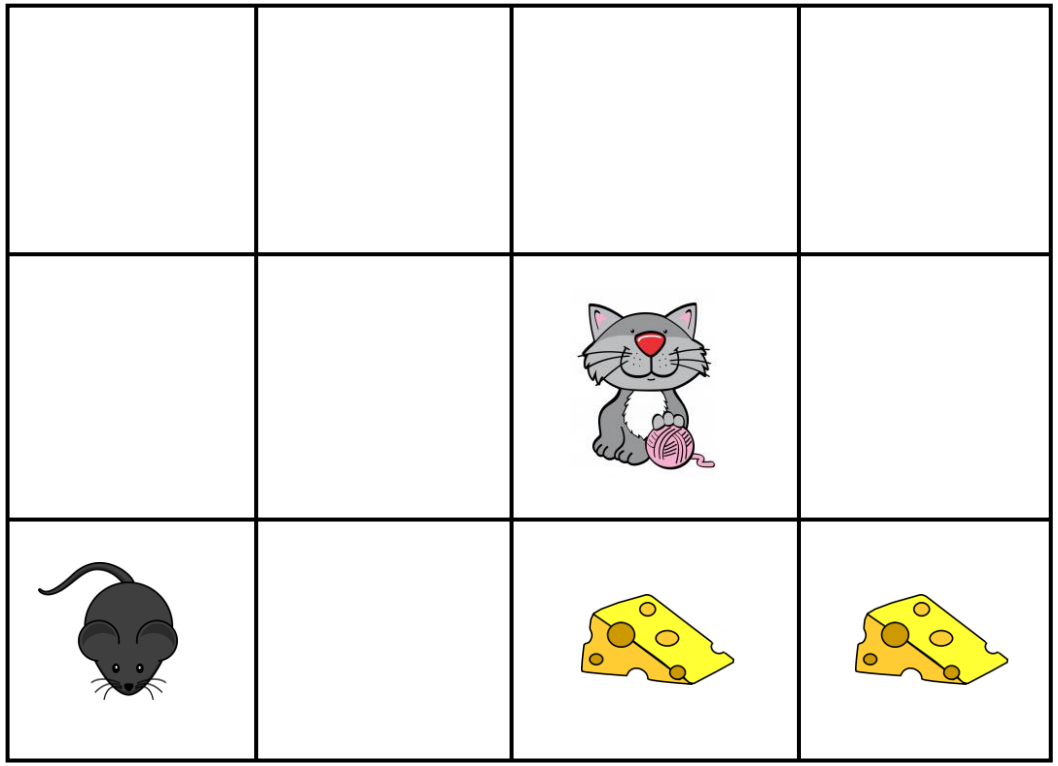
Loose: -10



Reinforcement Learning

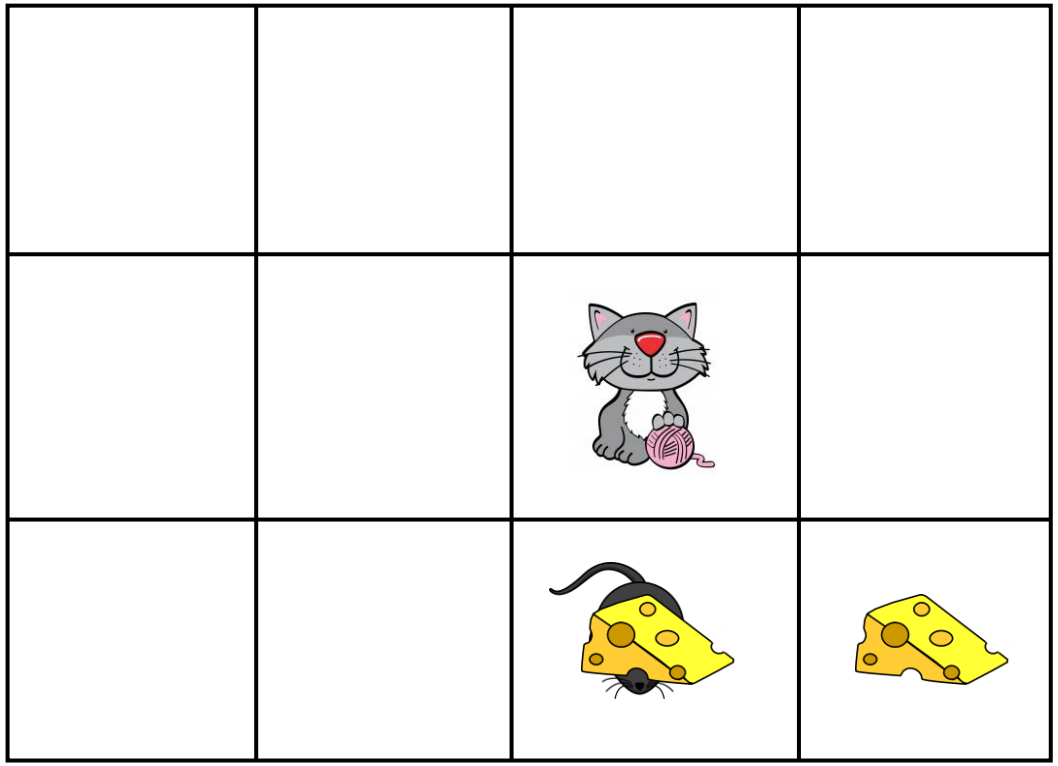


Reinforcement Learning

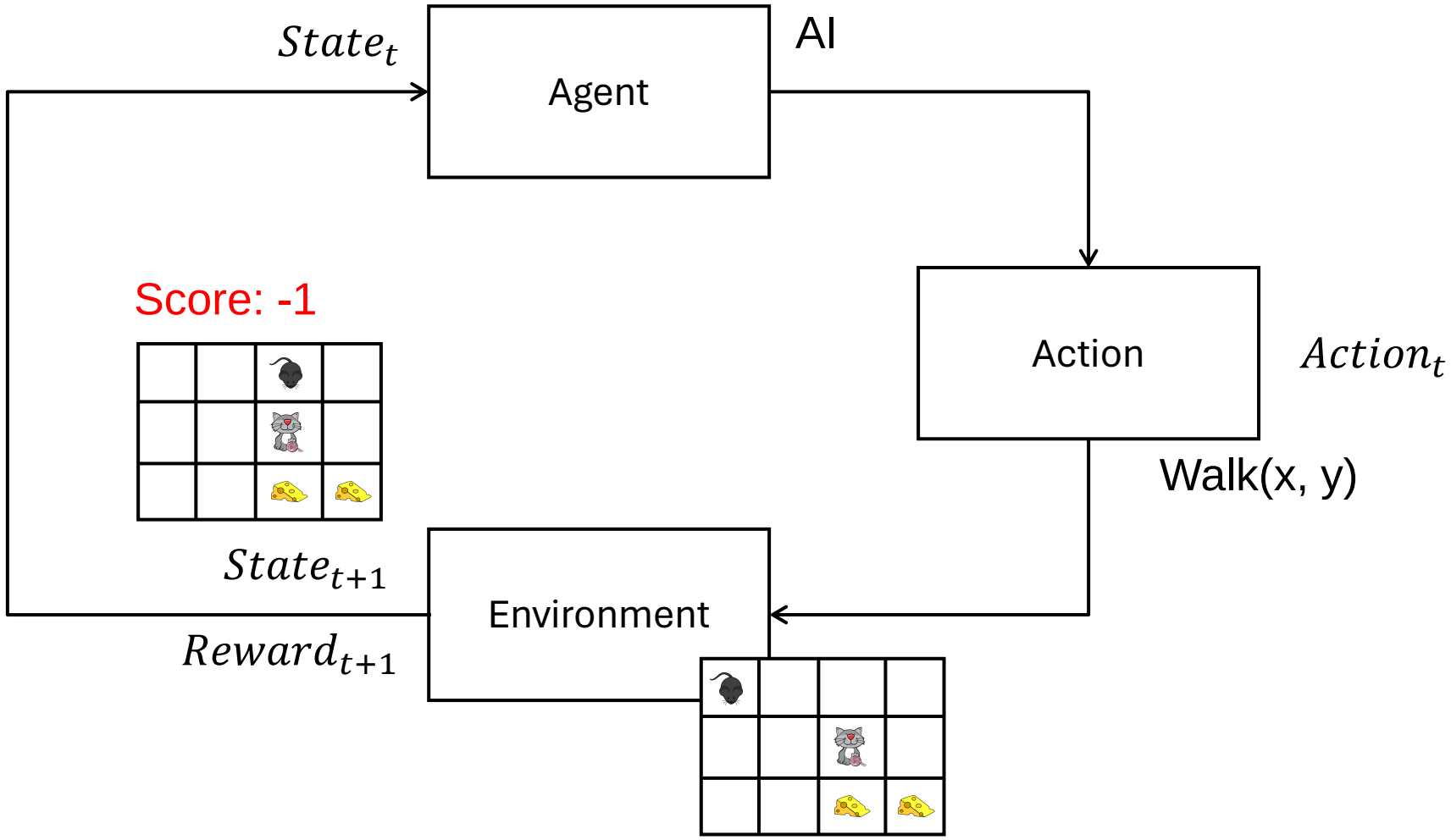


Reinforcement Learning

Score: +10



Reinforcement Learning



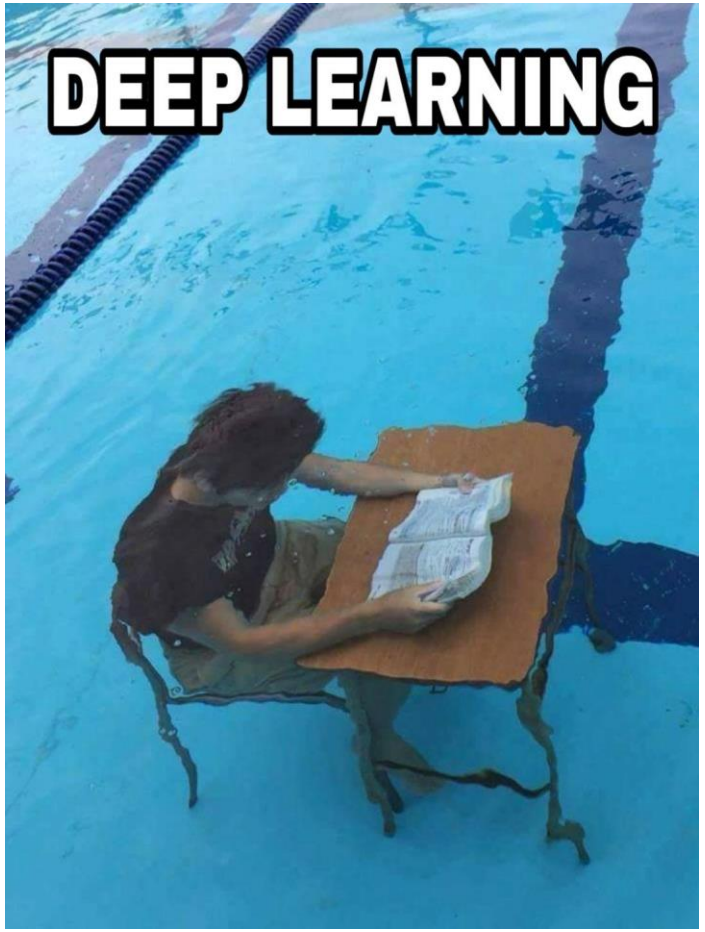
Q-Learning

$$\mathrm{Q}(s_t, a) = Q(s_t, a) + \alpha[R(s_t, a) + \gamma Q_{max}(s_{t+1}, a) - Q(s_t, a)]$$

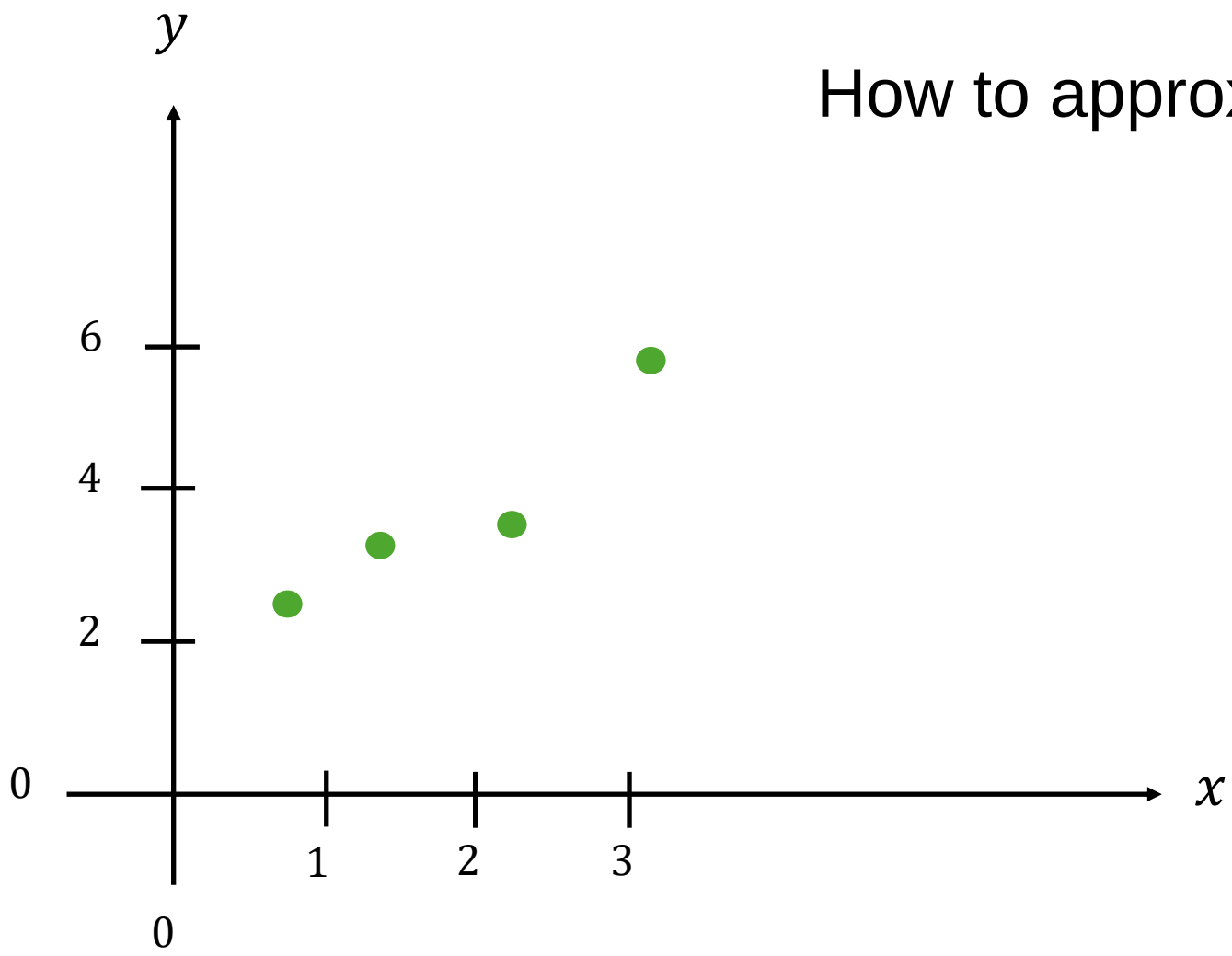
Where:
s: $State$
a: $Action$
γ: $Discounting\ Rate\ \rightarrow [0,1]$
α: $Learning\ Rate\ \rightarrow [0,1]$

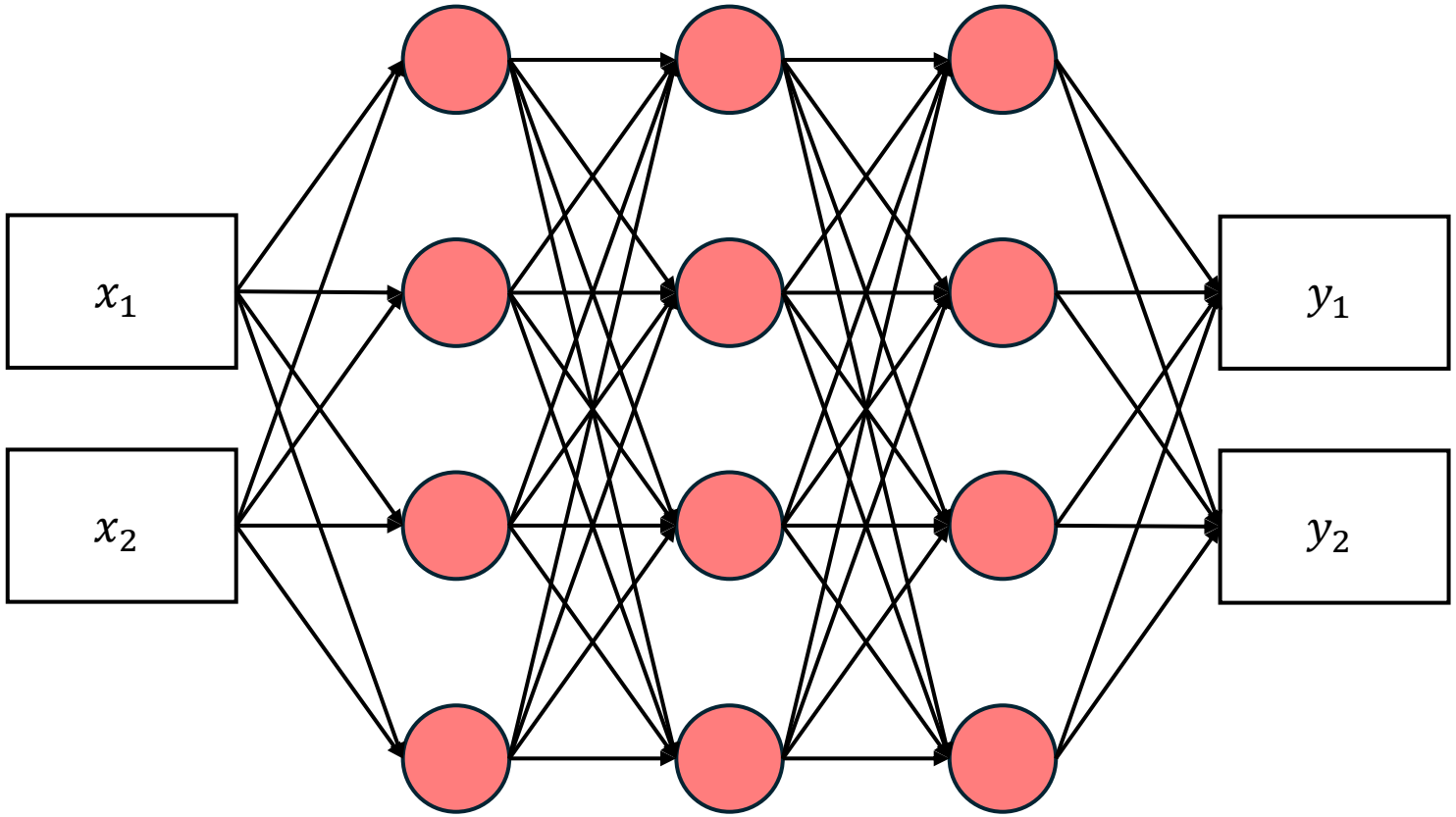
Markov Decision Process + Bellman Equation

How about **Deep Learning** ???



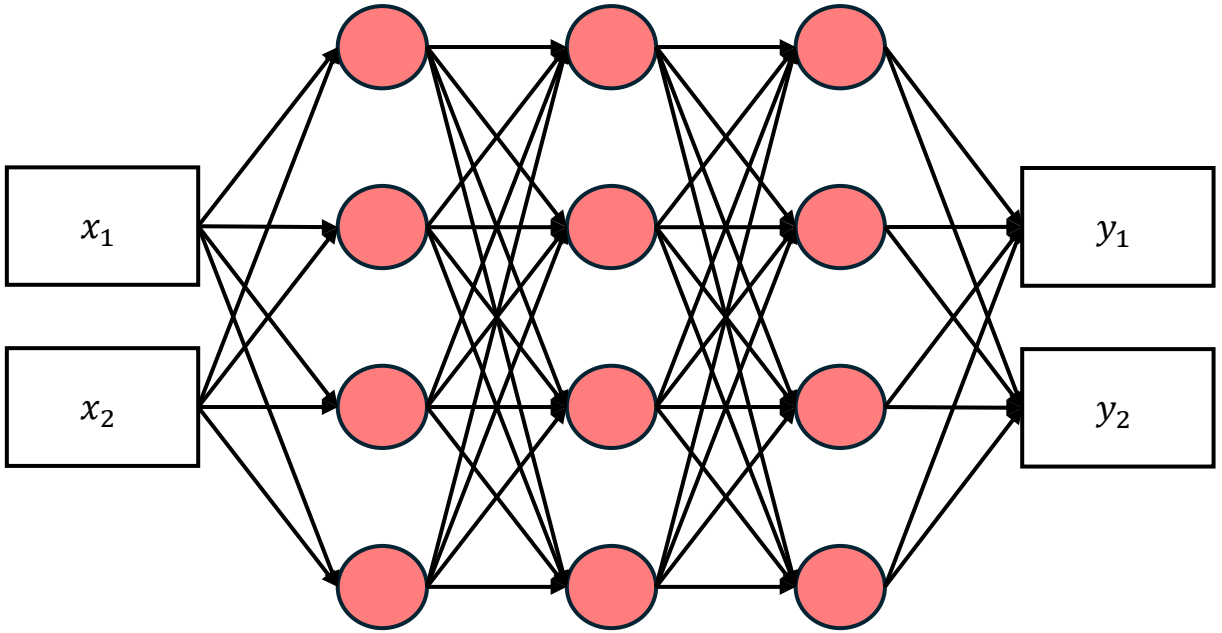
How to approximate this ???

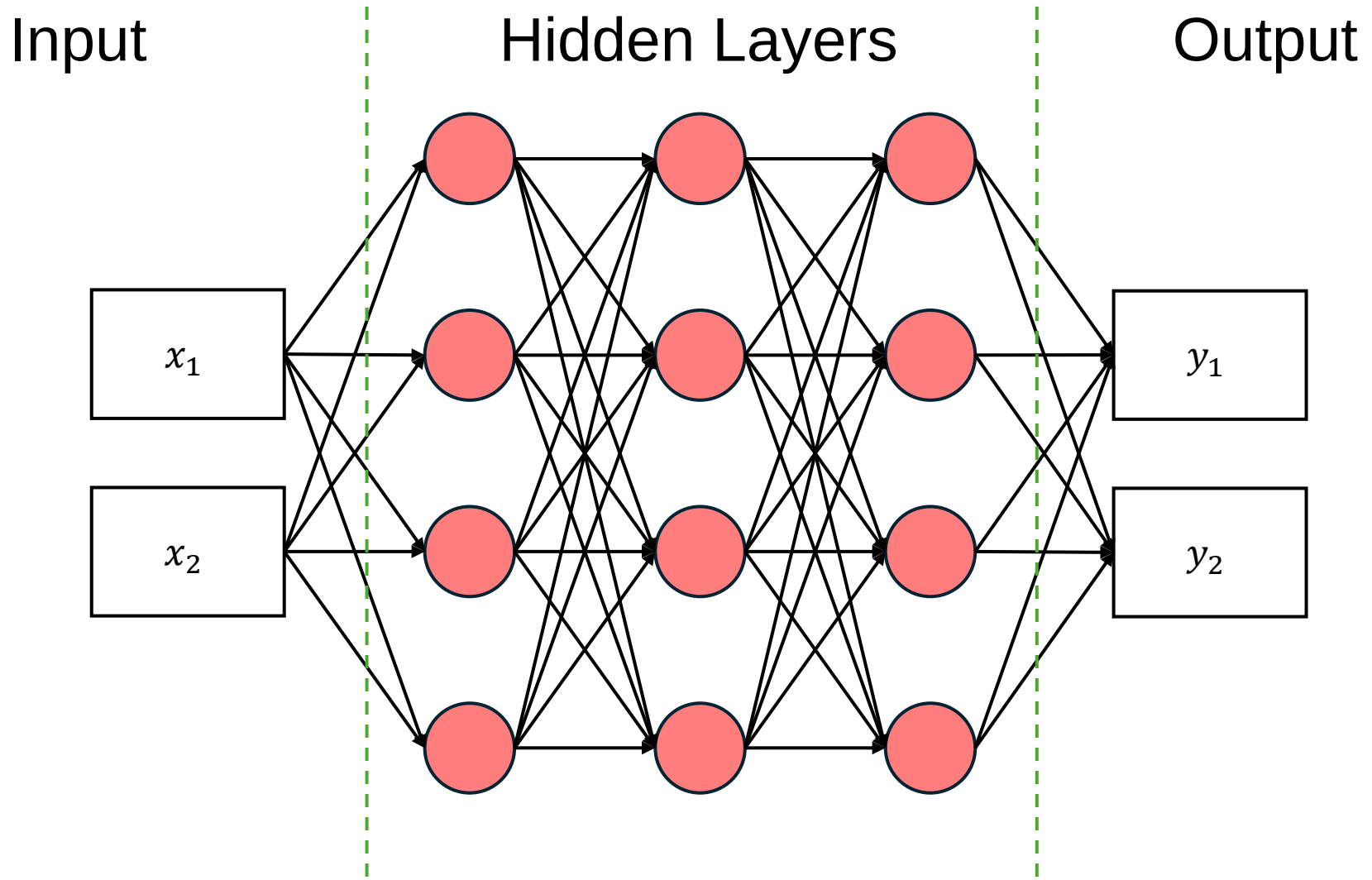



x_1
x_2
y_1
y_2

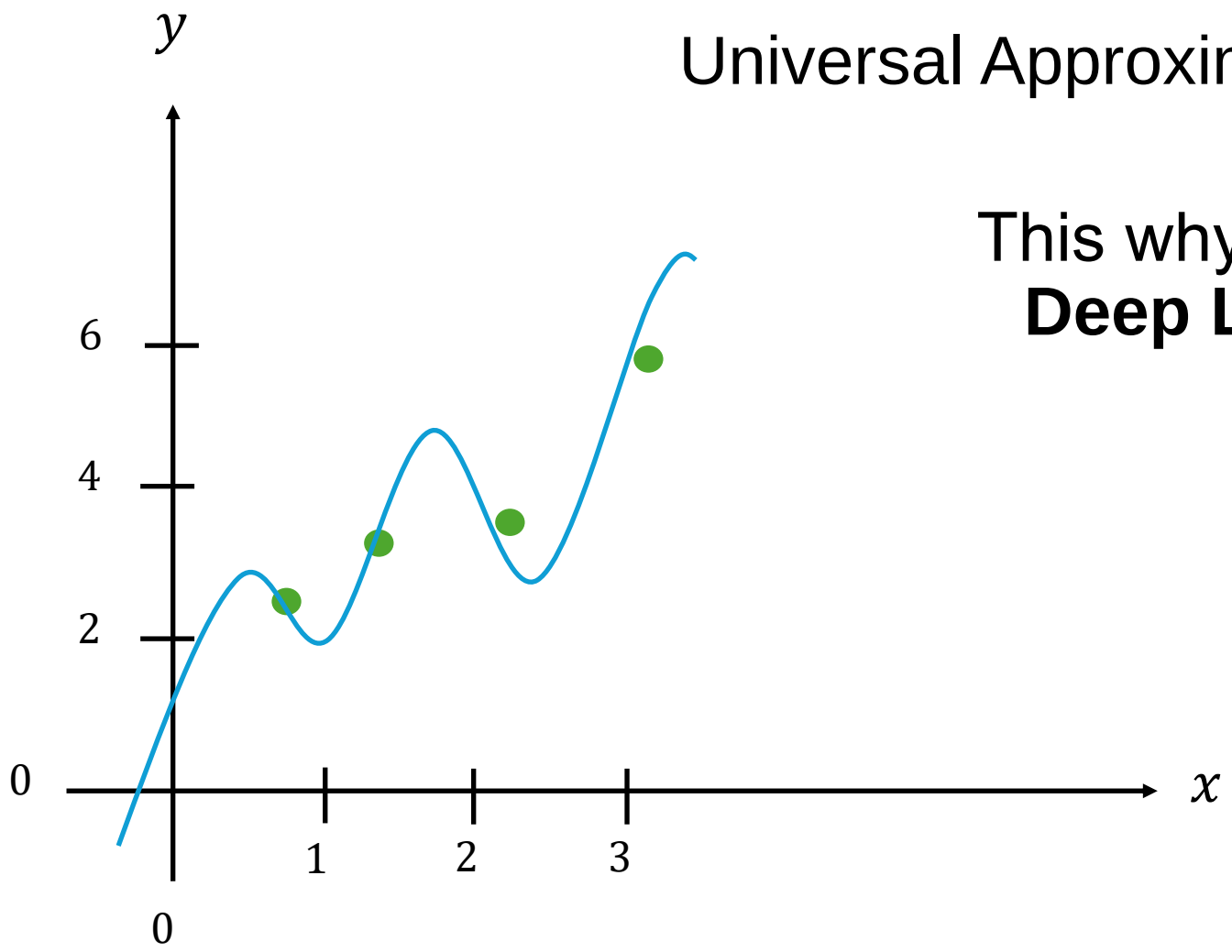
MLP (Multilayer perceptron)

(Sometimes we called Neural Network)




Input
Hidden Layers
Output
x_1
x_2
y_1
y_2

Universal Approximation Theorem



Universal Approximation Theorem

This why it's called
Deep Learning

But, recently our world has new theorem for **deep learning** that’s called **KANs.**

Kolmogorov-Arnold Networks

KAN: Kolmogorov–Arnold Networks

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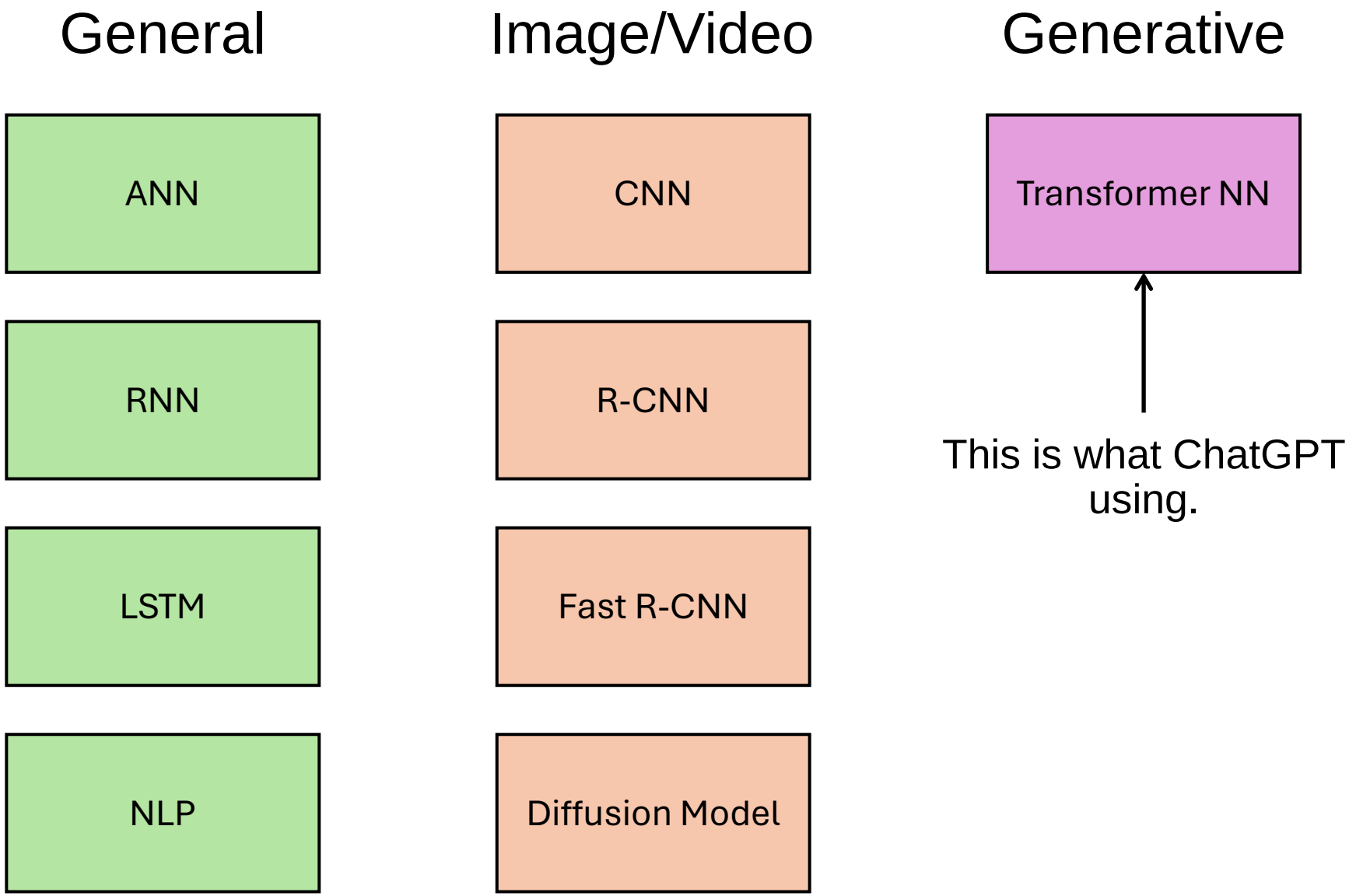
James Halverson[3,4] **Marin Soljačić**[1,4] **Thomas Y. Hou**[2] **Max Tegmark**[1,4]
[1] Massachusetts Institute of Technology
[2] California Institute of Technology
[3] Northeastern University
[4] The NSF Institute for Artificial Intelligence and Fundamental Interactions

Model	**Multi-Layer Perceptron (MLP)**	**Kolmogorov-Arnold Network (KAN)**
Theorem	**Universal Approximation Theorem**	**Kolmogorov-Arnold Representation Theorem**
Formula (Shallow)	$f(\mathbf{x}) \approx \sum_{i=1}^{N(\epsilon)} a_i \sigma(\mathbf{w}_i \cdot \mathbf{x} + b_i)$	$f(\mathbf{x}) = \sum_{q=1}^{2n+1} \Phi_q \left(\sum_{p=1}^{n} \phi_{q,p}(x_p) \right)$
Model (Shallow)	(a) *fixed* activation functions on *nodes*; *learnable* weights on *edges*	(b) *learnable* activation functions on *edges*; sum operation on *nodes*
Formula (Deep)	$\mathrm{MLP}(\mathbf{x}) = (\mathbf{W}_3 \circ \sigma_2 \circ \mathbf{W}_2 \circ \sigma_1 \circ \mathbf{W}_1)(\mathbf{x})$	$\mathrm{KAN}(\mathbf{x}) = (\mathbf{\Phi}_3 \circ \mathbf{\Phi}_2 \circ \mathbf{\Phi}_1)(\mathbf{x})$
Model (Deep)	(c) MLP(**x**); $\mathbf{W}_3$, σ_2, $\mathbf{W}_2$, σ_1, $\mathbf{W}_1$; *nonlinear, fixed*; *linear, learnable*; **x**	(d) KAN(**x**); $\mathbf{\Phi}_3$, $\mathbf{\Phi}_2$, $\mathbf{\Phi}_1$; *nonlinear, learnable*; **x**

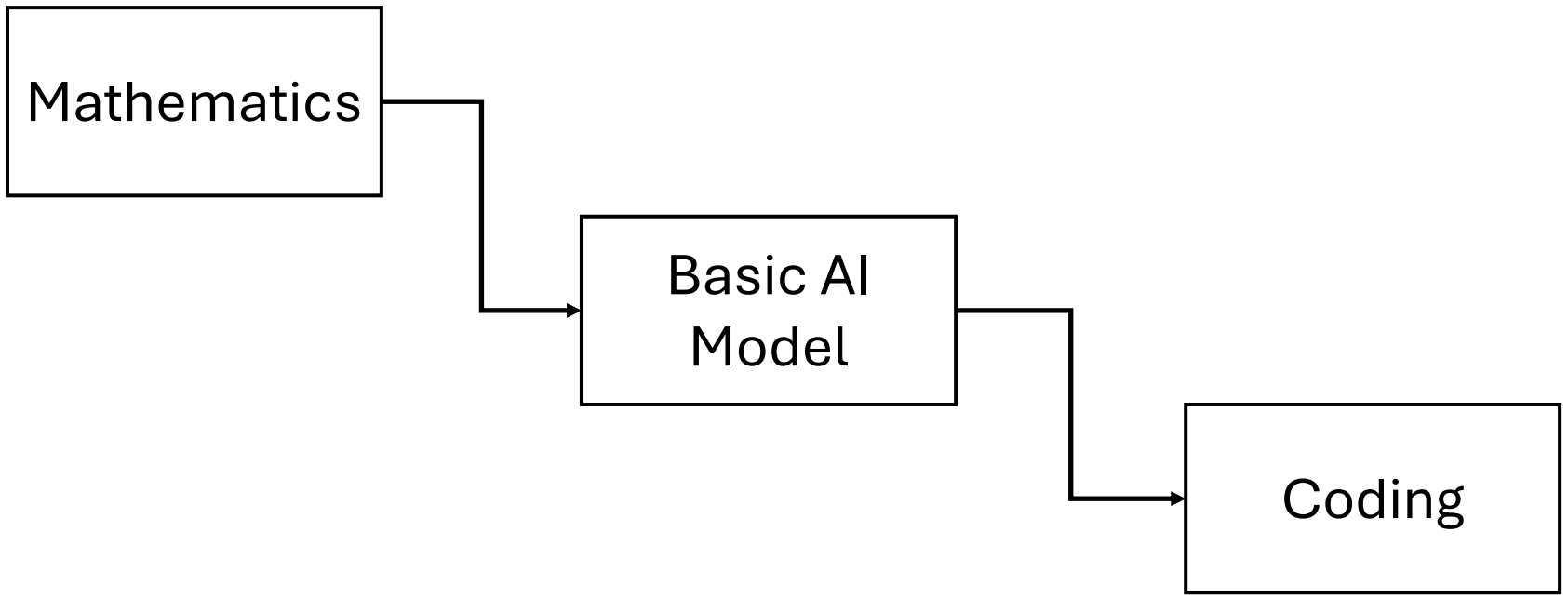
Figure 0.1: Multi-Layer Perceptrons (MLPs) vs. Kolmogorov-Arnold Networks (KANs)

Types of **Deep Learning**

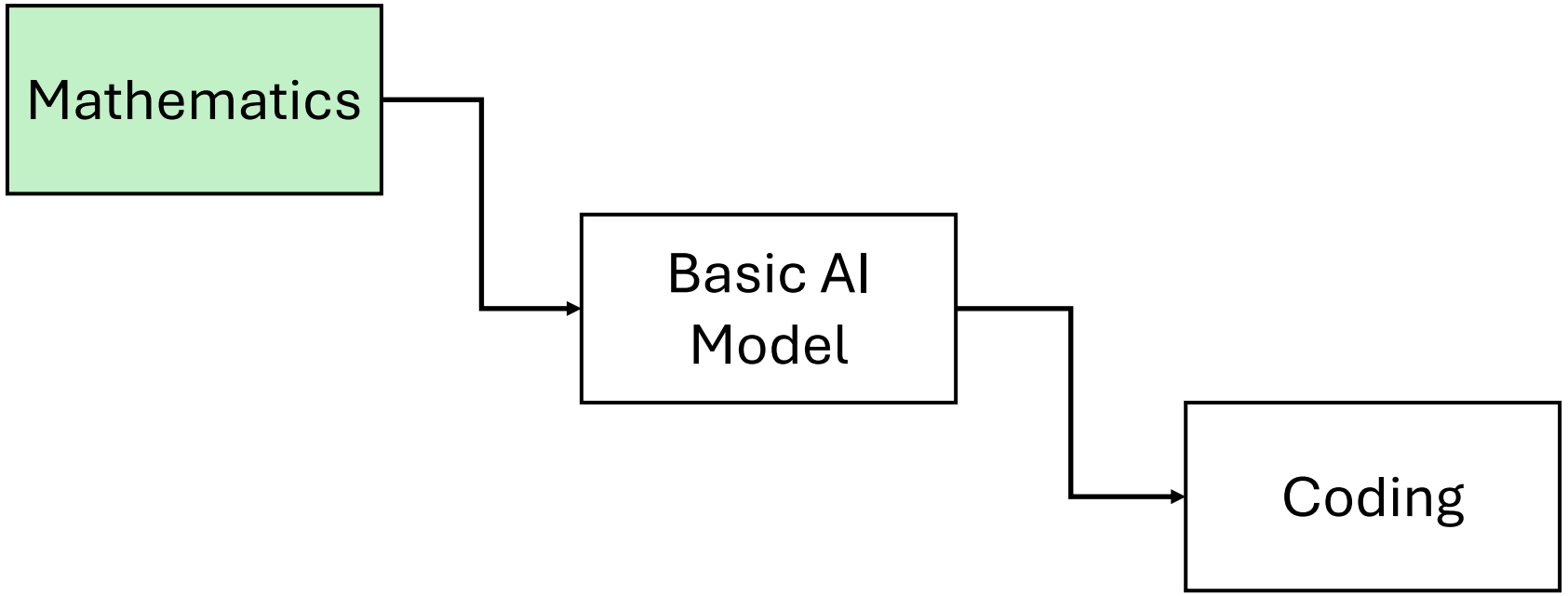

General
Image/Video
Generative
ANN
RNN
LSTM
NLP
CNN
R-CNN
Fast R-CNN
Diffusion Model
Transformer NN
This is what ChatGPT using.

Learning Path

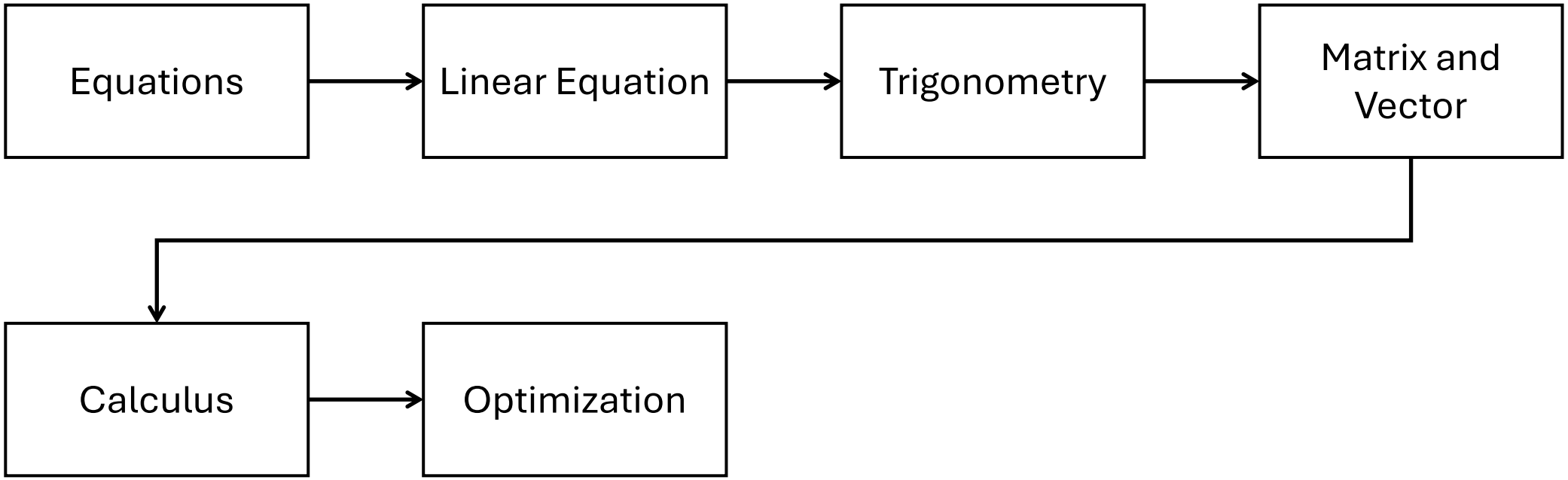
Learning Path



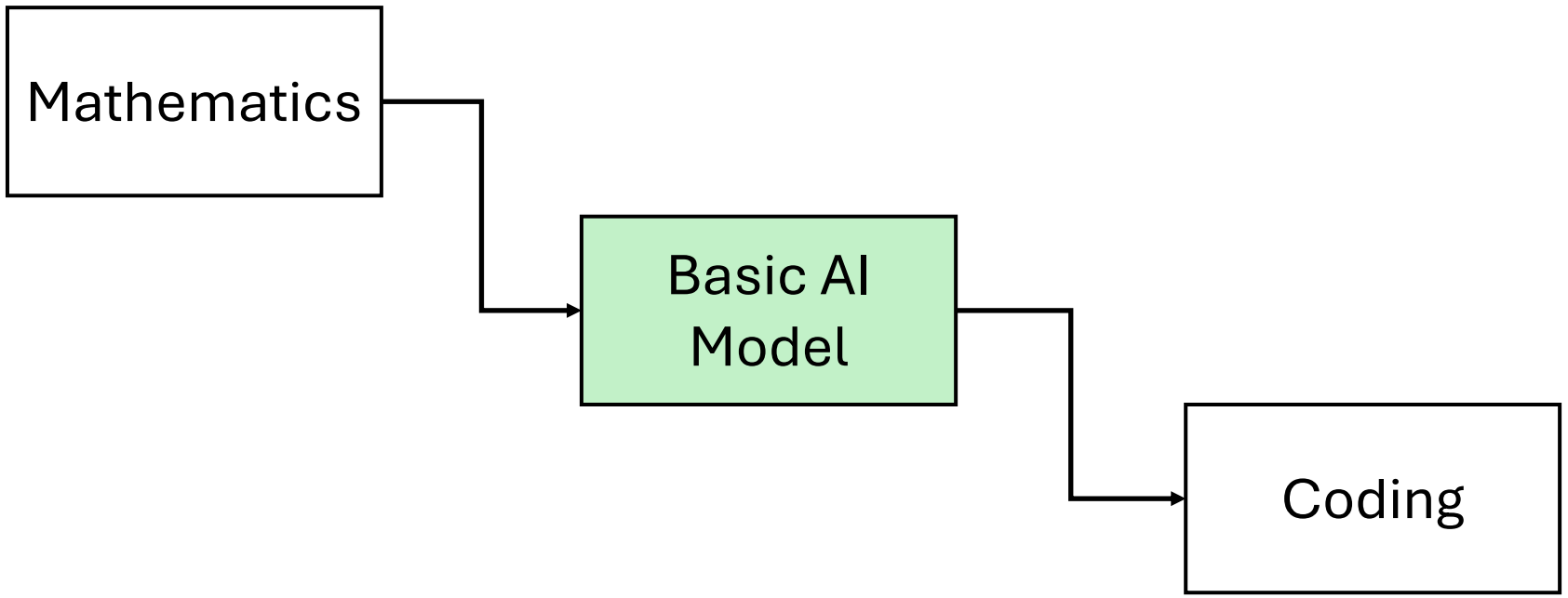
Learning Path



Mathematics



Learning Path



Basic AI Model

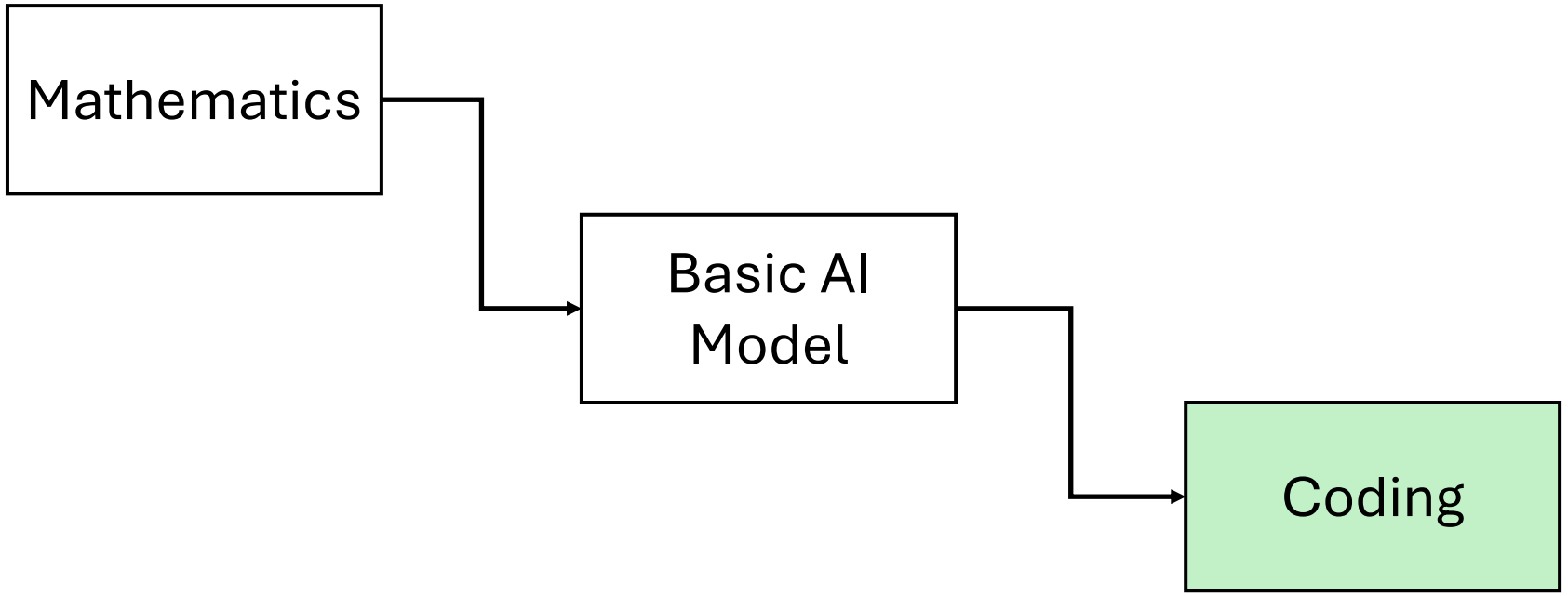
Linear Regression

Decision Tree

K-Means Clustering

ANN

Learning Path



Coding

Learning how to using basic
AI model in code.

Python

PyTorch

TensorFlow

Hugging Face

Deep Learning Tools