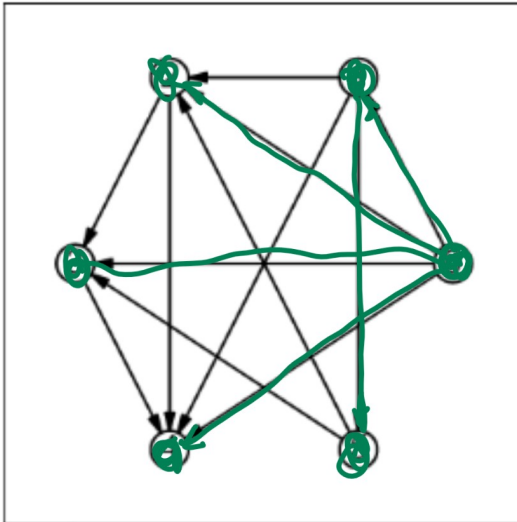M1 Q6 , M2 Q3

Question 6

• [2 points] (Select objects) Highlight a spanning tree of the following directed graph by selecting the nodes and edges in the spanning tree. Use the convention that parents point to their children.
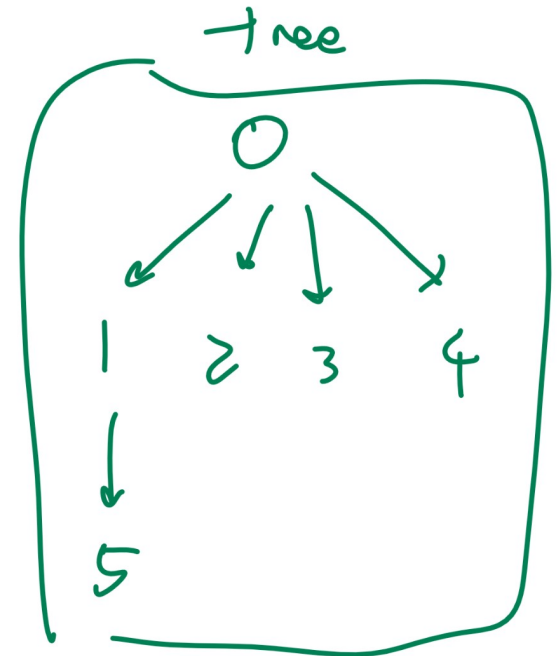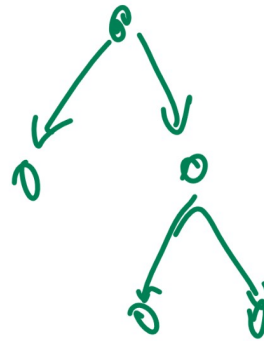
▼ Hint

A tree that contains all the nodes.

• Select (or deselect) a node by mouse click or touch, select (or deselect) a directed edge by mouse drag or touch "drag" from one node to another. The selected nodes and edges should appear red.
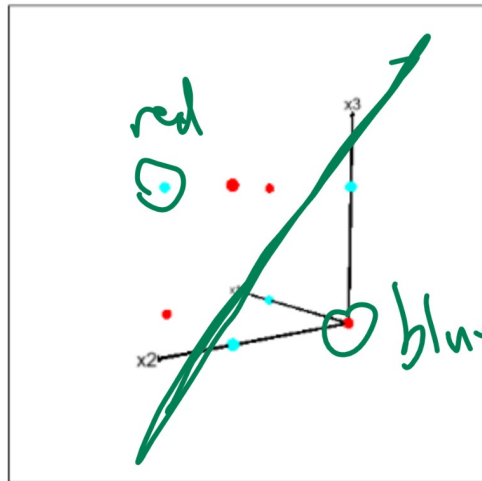

Clear

Question 3

• [3 points] What is the minimum number of training items that needs to be removed so that a Perceptron can learn the remaining training set (with accuracy 100 percent)?

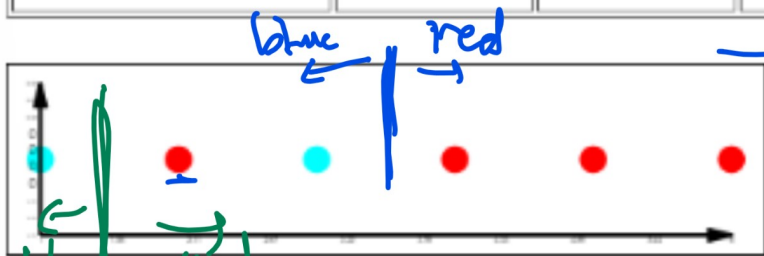| x_1	x_2	x_3	y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

M2 Q3

2D: test

red

blue

Question 4

• [3 points] What is the minimum zero-one cost of a binary (y is either 0 or 1) linear (threshold) classifier (for example, LTU perceptron) on the following data set?

x_i	1	2	3	4	5	6
y_i	1	0	1	0	0	0

blue   red

• a linear classifier is a vertical line that separates the two classes, you want to draw the line such that the least number of mistakes (i.e. zero-one cost) are made.

red

M2Q4

with $Cost(y, \hat{y})$

$\min \mathbb{1}\{y_i \neq \hat{y}_i\}$

$\hat{y}_i = \mathbb{1}\{x_i \leq 1.5\}$
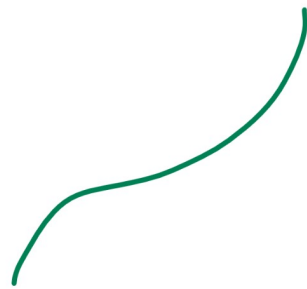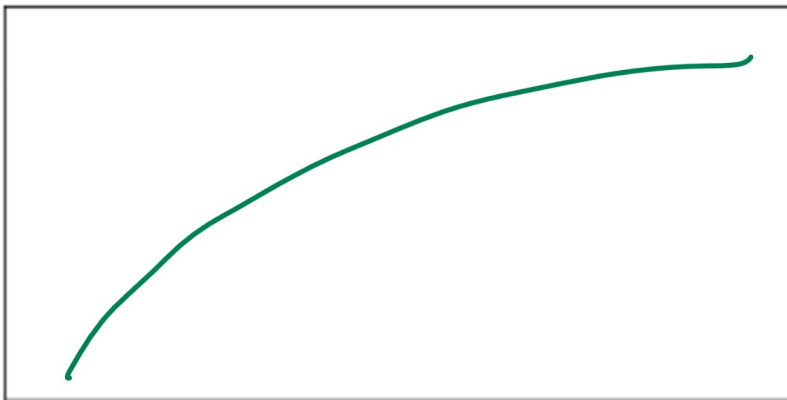
Ok $\hat{y}_i = \mathbb{1}\{x_i \leq 3.5\}$

$Cost = 1$

$$(x-1)^4 \longrightarrow 4(x-1)^3 \longrightarrow \underbrace{12(x-1)^2}_{\geq 0} \geq 0$$

con vex

Question 10

• [3 points] Which functions are (weakly) convex on $\mathbb{R}$?

▶ Hint

• You can plot an expression of x: [　　　] using [Plot] from [-1] to [1].

• Choices:

☐ $-\exp(-x)$

☐ x^3

☐ $-x^2$

☑ $\exp(-x) \geq 0$

☑ $(x-1)^4$

☐ None of the above

$$\exp(-x) \geq 0$$
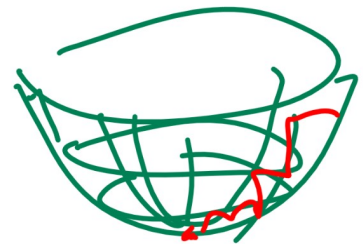
$$-\exp(-x) \leq 0$$

$$3x^2 \longrightarrow 6x \nearrow 0$$

$$-2x \longrightarrow -2 \leq 0$$

$$\min \quad CE \qquad y_i \log a_i + (1-y_i) \log(1-a_i)$$

$$a_i = \frac{1}{1 + e^{-(w^T x_i + b)}}$$

Hess $\longrightarrow$ p.s.d

$\searrow$ eigenvalues $\longrightarrow$ ≥ 0

w^*, b^*

$\log_e(5) \longrightarrow \dfrac{\log(5)}{\log(2)}$

$\log_{10}(5) = \dfrac{\log(5)}{\log(10)}$

$\longrightarrow$ $\dfrac{\log}{\cancel{\ln}}$ $\rightarrow$ base e   Math.js

Sun	Thur	MWF
Java P1	Python P1	Math.
		parr exam

$$\text{exam:} \quad 30 \text{ Qs} \begin{cases} \sim 10 \\ \sim 10 \\ \sim 10 \end{cases}$$

$$15 + 15$$

day 1   day 2

$M2 \sim M7$ randomization

$X1 - X3 \oplus$ Quiz Question

new questions

"new" question

in 2020
2021.