Ariel University
Machine Learning
Homework 2

Problem 1.

a) What is the VC-dimension of uni-directional axis-aligned rectangles on d-dimensional points (inside it red, outside is blue)?
b) What is the VC-dimension of bi-directional axis-aligned rectangles in the plane?

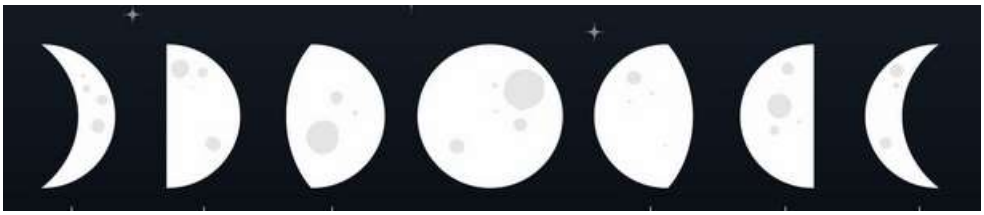
Prove your answers.

Problem 2.

a) What is the VC-dimensional uni-directional balls on d-dimensional points (inside is red, outside is blue)?
b) Give an upper bound for the VC-dimension of bi-directional circles in the plane.

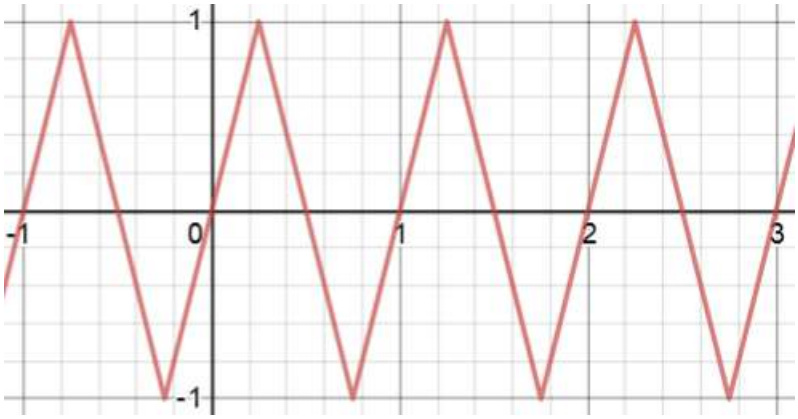
Prove your answers.

Problem 3. Prove an upper-bound for the VC-dimension of the infinite phases of the moon. Each phase is the intersection of two balls, one where white is inside, and one where white is outside.



Problem 4. What is the VC-dimension of the infinite set of triangle wave functions with amplitude 1 and period parameter p on points on the line? (See picture for p=1.) Prove your answer.

$$\frac{2}{\pi}\arcsin(\sin(2\pi x/p))$$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