

$$p(5, 2) = 6$$

Machine Learning HW 2

1. Positive rays: $m_H(N) = N+1$

$$m_H(k) < 2^k \Rightarrow k=1: 1+1=2$$

$$k=2: 2+1=3, 3 < 2^2 \Rightarrow 3 < 4$$

$\Rightarrow k=2$ is the smallest break point

$$\boxed{dvc = 1}$$

Positive intervals: $m_H(N) = \frac{1}{2}N^2 + \frac{1}{2}N + 1$

$$\frac{1}{2}(9) + \frac{1}{2}(3) + 1 = 7, 7 < 2^3 \Rightarrow 7 < 8$$

$\boxed{k=3} \Rightarrow$ smallest break pt.

$$\boxed{dvc = 2}$$

Convex sets: $m_H(N) = 2^N \Rightarrow$ break pt.

When $2^k < 2^k \Rightarrow \boxed{k=\infty} \Rightarrow$ smallest break pt.

$$\boxed{dvc = \infty}$$

2. a) $B(4, 1) = 1$

b) $B(4, 2) = 5$

x_1	x_2	x_3	x_4
0	0	0	0

x_1	x_2	x_3	x_4
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

c) $B(5, 2) = 6$

x_1	x_2	x_3	x_4	x_5
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

$\Rightarrow B(5, 2) = 6$

$B(4, 2) + B(4, 1)$

$$= 5 + 1$$

$6 \leq 6$ (\checkmark)

$$B(5, 2) \leq B(4, 1) + B(4, 2)$$