

1. In which of the product, uniform and box topologies on  $\mathbb{R}^{\mathbb{N}}$  are the following sequences converge? Find the limits of the convergent sequences.

$$\begin{aligned}w_1 &= (1, 1, 1, 1, \dots), & w_2 &= (0, 2, 2, 2, \dots), & w_3 &= (0, 0, 3, 3, \dots), & \dots; \\x_1 &= (1, 1, 1, 1, \dots), & x_2 &= (0, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \dots), & x_3 &= (0, 0, \frac{1}{3}, \frac{1}{3}, \dots), & \dots; \\y_1 &= (1, 0, 0, 0, \dots), & y_2 &= (\frac{1}{2}, \frac{1}{2}, 0, 0, \dots), & y_3 &= (\frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \dots), & \dots; \\z_1 &= (1, 1, 0, 0, \dots), & z_2 &= (\frac{1}{2}, \frac{1}{2}, 0, 0, \dots), & z_3 &= (\frac{1}{3}, \frac{1}{3}, 0, 0, \dots), & \dots.\end{aligned}$$

2. Find the closure of the subset

$$A = \{(x_i)_{i \in \mathbb{N}} : \text{there is an } n \in \mathbb{N} \text{ such that } x_i = 0 \text{ for all } i \geq n\}$$

of  $\mathbb{R}^{\mathbb{N}}$  under the uniform topology. Justify your answer.