7.2.

b) $\pi_v = E[Z_v] = E\left(\sum_{i=1}^{n} \mathbb{1}_{\{i_j\}}(v)\right)$

WHERE $v \in U = \{1, \ldots N\}$

$S = \{i_1, \ldots i_n\} \in U^n$

$P(v \in i) = \frac{n}{N}$ (FROM SLIDES) $\Rightarrow P(v \notin i) = \frac{N-n}{N}$

AS $i_1, i_2 \ldots i_n$ ARE INDEPENDANT

$$\pi_v = \sum_{i=1}^{n} \left[i \cdot P(v \in i_1)^{i} \cdot P(v \notin i_1)^{n-i} \right]$$

$$= \sum_{i=1}^{n} \left[i \cdot \left(\frac{n}{N}\right)^{i} \cdot \left(\frac{N-n}{N}\right)^{n-i} \right]$$