A8(a)

We are given that:

$$\text{diag}(v) = \begin{bmatrix} v_1 & 0 & \cdots & 0 \\ 0 & v_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & v_n \end{bmatrix} \quad \text{and} \quad \text{diag}(w) = \begin{bmatrix} w_1 & 0 & \cdots & 0 \\ 0 & w_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & w_n \end{bmatrix}.$$

If we assume that $\text{diag}(v)^{-1} = \text{diag}(w)$, it follows that:

$$w_i = \frac{1}{v_i}, \quad \forall i \in \{1, 2, \ldots, n\}.$$

We are also given that $g(v_i) = w_i$, so substituting the relationship between v_i and w_i, we find:

$$g(v_i) = \frac{1}{v_i}.$$

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