1. Let $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be the linear transformation that slides a point diagonally up or down at a 45° angle until it hits the line $y = x$, as in the following picture:

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<table>
<thead>
<tr>
<th>Name</th>
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a) [4 points] Compute the standard matrix for $T$.

b) [3 points] Is $T$ one-to-one? If so, explain why; if not, find two different vectors with the same image.

c) [3 points] Is $T$ onto? If so, explain why; if not, find a vector not in the range.