Name: —————————————————————————   ————— / 10

There are 10 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. (4 points)

   (a) Are any two planes through the origin in $\mathbb{R}^3$ isomorphic? Justify your answer.

   (b) Are any two planes **not** necessarily through the origin in $\mathbb{R}^3$ isomorphic? Justify your answer.

2. (6 points) Determine whether the map $f : \mathscr{P}_2 \to \mathbb{R}^2$ given by $ax^2 + bx + c \mapsto \begin{pmatrix} a+b \\ a-c \end{pmatrix}$ is a homomorphism (or linear map).