Math 2550
HW 1 - Part 2
Vectors

1. Let $\vec{u}, \vec{v}, \vec{w} \in \mathbb{R}^2$ and $\alpha, \beta \in \mathbb{R}$.
   Let $\vec{0}$ be the zero vector in $\mathbb{R}^2$.
   (a) Prove that $\vec{u} + \vec{0} = \vec{u}$
   (b) Prove that $(\alpha + \beta)\vec{v} = \alpha\vec{v} + \beta\vec{v}$
   (c) Prove that $(\vec{u} + \vec{v}) + \vec{w} = \vec{u} + (\vec{v} + \vec{w})$
   (d) Prove that $\alpha(\vec{u} \cdot \vec{v}) = (\alpha\vec{u}) \cdot \vec{v}$
2. Let $\vec{u}, \vec{v}, \vec{w} \in \mathbb{R}^3$ and $\alpha, \beta \in \mathbb{R}$.
   Let $\vec{0}$ be the zero vector in $\mathbb{R}^3$.
   (a) Prove that $\vec{u} + \vec{v} = \vec{v} + \vec{u}$
   (b) Prove that $(\alpha + \beta)\vec{v} = \alpha\vec{v} + \beta\vec{v}$
   (c) Prove that $\alpha(\beta\vec{v}) = (\alpha\beta)\vec{v}$
   (d) Prove that $\vec{0} \cdot \vec{u} = 0$
   (e) Prove that $\vec{u} \cdot (\vec{v} + \vec{w}) = \vec{u} \cdot \vec{v} + \vec{u} \cdot \vec{w}$