1.3 VECTOR EQUATIONS

 \mathbb{R}^n is the collection of all lists (*ordered n-tuples*) of *n* real numbers. Example:

$$\mathbf{u} = \begin{bmatrix} u_1 \\ \vdots \\ u_n \end{bmatrix}$$

Algebraic Properties of \mathbb{R}^n

For all **u**, **v**, **w** in \mathbb{R}^n and all scalars *c* and *d*:

- $\mathbf{u} + \mathbf{v} = \mathbf{v} + \mathbf{u}$
- (u + v) + w = u + (v + w)
- $\bullet \ \mathbf{u} + \mathbf{0} = \mathbf{0} + \mathbf{u} = \mathbf{u}$
- u + (-u) = -u + u = 0
- $c(\mathbf{u} + \mathbf{v}) = c\mathbf{u} + c\mathbf{v}$

commutative property

associative property

zero vector

 $-\mathbf{u}$ denotes $(-1)\mathbf{u}$

distributive property

- $(c+d)\mathbf{u} + c\mathbf{u} + d\mathbf{u}$
- $c(d\mathbf{u}) = (cd)\mathbf{u}$
- 1**u** = **u**