

ASE2010 Applied linear algebra: Homework #11) *Linear functions.*

- a) Show that an inner product function, $f(x) = a^T x$, is linear.
- b) Show that any scalar-valued linear function $f(x)$ satisfying superposition can be expressed as an inner product function, say $f(x) = a^T x$. Explicitly state the elements of a in terms of f .

2) *Affine functions.*

- a) Show that an inner product function plus a shift, $f(x) = a^T x + b$, is affine.
- b) Show that any scalar-valued affine function $f(x)$ satisfying the restricted superposition can be expressed as an inner product function plus a shift, say $f(x) = a^T x + b$. Explicitly state the elements of a and b in terms of f .

3) *Parallelogram.* Draw two different vectors u and v out from the origin. Complete two more sides to make a parallelogram with diagonals $w = u + v$ and $z = u - v$. Show that $\|w\|^2 + \|z\|^2 = 2\|u\|^2 + 2\|v\|^2$.4) *VMLS Exercises.*

- a) **2.3** *Motion of a mass in response to applied force.*
- b) **2.12** *Price change to maximize profit.*
- c) **3.13** *Nearest point to a line.*