

# Financial Mathematics 5001: Homework 1 (0021)

Due on 28 September 2011

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**Solutions**

**0021-1**

Compute

$$(-2, -3, 4) \cdot (-7, 4, -5).$$

$$14 + -12 + -20 = -18.$$

**0021-2**

Compute

$$(2, 4, 6, 8) \cdot (1, -2, 3, -4).$$

$$2 - 8 + 18 - 32 = -20.$$

**0021-3**Is  $\{(1, -3), (-3, 9)\}$  a linearly independent set in  $\mathbb{R}^2$ ? Why or why not?

It is not, since  $3(1, -3) + (-3, 9) = (0, 0)$ .

**0020-4**Is  $\{(1, -3), (-3, 9)\}$  a basis of  $\mathbb{R}^2$ ? Why or why not?

It is not. The dimension of  $\mathbb{R}^2$  is two, while the dimension of the space spanned by the set is one.

**0020-5**Write  $(2, 3, 4)$  as a linear combination of  $(1, 2, 3)$ ,  $(4, 7, 6)$ , and  $(5, 9, 10)$ .

We want  $a, b, c \in \mathbb{R}$  such that

$$(2, 3, 4) = a(1, 2, 3) + b(4, 7, 6) + c(5, 9, 10).$$

Solving this system of three linear equations in three unknowns gives  $a = -6, b = -3, c = 4$ .