

**Quiz 5****Question 1. (10 pts)**

Let  $F : \mathbb{R}^2 \rightarrow \mathbb{R}^2$  be the linear transformation defined by  $F(x, y) = (2x+3y, 4x-5y)$ . Find the matrix representation of  $F$  with respect to the basis  $S = \{u_1, u_2\} = \{(1, 2), (2, 5)\}$ .

**Solution:** This is in fact **Example 6.1** on Page 196 of the textbook. You can check out the solution in the book.

**Question 2. (10 pts)**

Let  $V$  be a vector space spanned by some functions on  $\mathbb{R}$ . Assume  $S = \{e^{3t}, te^{3t}, t^2e^{3t}\}$  is a basis of  $V$ . Let  $\mathbf{D}$  be the differential operator on  $V$ , that is,

$$\mathbf{D}(f) = \frac{df}{dt}.$$

Find the matrix representation of  $\mathbf{D}$  relative to the basis  $S$ .

**Solution:** This is in fact **Problem 6.8** on Page 209 of the textbook. You can check out the solution in the book.