

Assignment # 5

Due *Wednesday 10/22* at start of class

Exercise 6.1.

Exercise 6.4.

Exercise 6.5.

Exercise 7.1.

Exercise 7.3.

VIII. First, read pages 52, 53,54 on “When Vectors become Continuous Functions”. Then do an analogous calculation for the interval $[0, \infty)$, as follows:

Suppose the inner product of f and g is the integral

$$(f, g) = \int_0^{\infty} \overline{f(x)}g(x) dx.$$

(For the duration of this problem you will not need to worry about the improper integral, as you shall see.) Now consider the “[$0, \infty) \times 5$]” matrix

$$A = \left[\begin{array}{c|c|c|c|c} e^{-x} & e^{-2x} & e^{-3x} & e^{-4x} & e^{-5x} \end{array} \right].$$

That is, consider e^{-jx} , for $j = 1, \dots, 5$, which are functions on $[0, \infty)$, as the columns of a matrix.

Find Q, R so that $A = QR$. (*That is, do Gram-Schmidt.* But record the coefficients r_{ij} as you go, in the appropriate manner, so that the columns of A can be recovered.)