MACM 316 – Homework 7

- Problems are not to be submitted. The related quiz will be given in class.
- Feel free to use Canvas discussions but please keep in mind that these forums are open.

A. Least squares (cont'd)

1. Show that $QR = A$, where

$$Q := \begin{pmatrix} -1/3 & 2/3 \\ -2/3 & 1/3 \\ 2/3 & 2/3 \end{pmatrix}, \quad R := \begin{pmatrix} -3/4 & 9 \\ 0 & 3 \end{pmatrix}, \quad A := \begin{pmatrix} -1/4 & -1 \\ -1/2 & -5 \\ 1/2 & 8 \end{pmatrix}.$$

   Is Q orthogonal?

2. Use a QR factorization of A (as defined above) to solve the least-squares problem

$$\min_{\mathbf{z}\in\mathbb{R}^2} \|A\mathbf{z} - \mathbf{b}\|, \quad \text{where } \mathbf{b} := \begin{pmatrix} 1/4 \\ 3/2 \\ -5/2 \end{pmatrix}.$$

B. Numerical differentiation

Section 4.1, Ex 1

Section 4.1, Ex 2

Section 4.1, Ex 3

Section 4.1, Ex 4

Section 4.1, Ex 5

Section 4.1, Ex 6

Section 4.1, Ex 24

C. Numerical integration and composite formulae

Section 4.3, Ex 1

Section 4.3, Ex 2

Section 4.3, Ex 6

Section 4.3, Ex 19

Section 4.4, Ex 1

Section 4.4, Ex 3

Section 4.4, Ex 11

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