

BRAC University (Department of Computer Science and Engineering)

CSE 330 (Numerical Methods) for FALL 2022 Semester

Quiz 6

Student ID:

Full Marks: 20

Section:

Name:

Duration: 45 minutes

1. [CO2] A student has decided to sell the football team's jerseys as a form of relaxation after the stressful midterm exam. In his shop, there are x_1 jerseys of Team Japan and x_2 jerseys of Team South Korea. The total number of jerseys is 40. On the first day, he sold each jersey of two clubs for 400 tk and he earned 16000 tk in total. However, when Japan defeated Spain, each Japanese jersey cost 500 tk, while the price of a South Korean jersey remained unchanged. He then received a total of 19000 tk. In the following, this overdetermined system will be solved by using the QR Decomposition Method by answering the following step by step:
 - (a) [1.5 marks] Write down the 3 linear equations that relate the variable x_1 and x_2 .
 - (b) [1.5 marks] Identify the matrices A , x and b so that the equations in the previous question can be expressed in the standard matrix equation form $Ax = b$.
 - (c) [4.5 marks] From matrix A in the previous question, compute the matrices Q and R such that $A = QR$, where the symbols have their usual meanings.
 - (d) [2.5 marks] Evaluate $Q^T b$, and finally solve the system by evaluating x (that is, evaluate x_1 and x_2).
2. [CO2] Consider a function $f(x) = e^x + x$ which is continuous on the interval $[1, 3]$. Use this function to answer the following:
 - (a) [2 marks] Find the actual integral value for this function.
 - (b) [6 marks] Use Composite Newton-cotes formula to find the numerical integration for $m = 4$.
 - (c) [2 marks] Compute the error in percentage between the results obtained in the previous two parts. How can we decrease the error more?