CE 601 NUMERICAL METHODS

TUTORIAL – 7

Marks – 60   **Date: 28-September-2012**

The due date of responses to the tutorial questions is on 03-October-2012 (Wednesday). You may use if required, computational programs like Matlab, Mathematica, Fortran, C, C++, etc. or any other convenient programming language (maybe even MS-Excel) to evaluate operations like additions, multiplications, matrix operations, etc.

1. The specific volume v (m^3/kg) of steam, corresponding to the van der Waal equation of state is a function of pressure P (kN/m^2) and temperature T (K). the following observations were recorded in the Table below:

$P \mid T \rightarrow$ ↓	*700*	*800*	*900*
9000	0.031980	0.037948	0.043675
10000	0.028345	0.033827	0.039053
11000	0.025360	0.030452	0.035270

   Interpolate the specific volume $v(9650,840)$ using successive quadratic univariate method.   **[20 marks]**

2. For incompressible steady fluid flow through a round pipe, it is observed that there will be a pressure drop due to friction. For laminar flow, the friction is accounted in terms of Darcy's friction coefficient f. in a particular experiment, this friction coefficient f is measured with respect to different values of Reynold's number (Re) and is tabulated below. Find the best power fit of friction coefficient with respect to Reynold's number. **[20 marks]**

Re	500	1000	1500	2000
f	0.032	0.016	0.0107	0.008

3. Develop cubic splines for the following data in the table below. Subsequently interpolate $f(4)$. The second derivatives at the two ends are zero.   **[20 marks]**

x	1	2	3	5	6
f(x)	4.75	4.00	5.25	19.75	36