CS1003 SAMPLE IN-CLASS TEST

All questions carry equal marks

Q1 Solve the following linear system using Gaussian Elimination:

$$\begin{aligned} 3x + 2y + z &= 11 \\ x + y + z &= 1 \\ 2x + y + 2z &= 4 \end{aligned}$$

Q2 Find the determinant of the following 3×3 matrix:

$$\begin{pmatrix} 3 & 1 & 5 \\ 2 & 2 & 4 \\ 4 & 1 & 5 \end{pmatrix}$$

Q3 Find the eigenvalues associated with the following 3×3 matrix:

$$\begin{pmatrix} 5 & 4 & 2 \\ 4 & 5 & 2 \\ 2 & 2 & 2 \end{pmatrix}$$

Q4 Find the quartic Taylor polynomial about 0 for the function $f(x) = 2\cos(3x)$

Q5 Use the standard Taylor series to find the first two non-zero terms of the Taylor series about 0 for the function

$$f(x) = x(1+x)^{-\frac{1}{2}} - \ln(1+x)$$

and use this to show that the corresponding Taylor polynomial estimate for $f(0.02)$ is 3.2×10^{-7} (to two significant figures).