Northern Cyprus Campus


Please write all commands that you use in MATLAB on the exam paper (except the ones that belong to unsuccessful trials), as well as the answer of the question. You may not use the shortcut commands (such as 'inv' or 'eig') to solve a question, however you may use them to check your answers.

Q1 (25 pts.) Solve the following system of equations using partial pivoting:

$$
\begin{aligned}
2 x+4 y-5 z+w & =2 \\
5 x-y+10 z-6 w & =-1 \\
x+6 y-2 z+3 w & =1 \\
8 x+4 y-z+15 w & =-10
\end{aligned}
$$

Q2 (25 pts.) Find all eigenvalues and eigenvectors of the matrix
$\left[\begin{array}{lll}2 & 1 & 2 \\ 1 & 3 & 2 \\ 2 & 2 & 4\end{array}\right]$

Q3 (25 pts.) Let $\mathbf{F}(x, y)=\left(x^{2},-2 x y^{3}+\cos (x y)\right)$. Evaluate the line integral $\int_{C} \mathbf{F} \cdot d \mathbf{r}$ where $C$ is the upper half of the unit circle, traversed counterclockwise. Use the trapezoid rule for the integration.

Q4 (25 pts.) Let $f(x)=1+x^{2}+x^{3}-x^{4}$.
(a) Find the intervals in which $f(x)$ is positive and negative.
(b) Consider the triangles with vertices $(0,0),(a, 0),(a, f(a))$ where both $a$ and $f(a)$ are positive. Find the value(s) of $a$ such that this triangle has the maximum area.
(c) Find the center of mass of the triangle found in part (b) using double integrals.

