2017 Fall EE203001 Linear Algebra - Quiz 8 (solution)

Name: ID:

Please find the determinant of the matrix A:

$$A = \begin{bmatrix} 2017 & 0 & 2008 & 1 \\ 0 & 1998 & 2003 & 0 \\ 0 & 2000 & 2005 & 0 \\ 2009 & 0 & 2013 & 2 \end{bmatrix}$$

Ans:

$$A = \begin{bmatrix} 2017 & 0 & 2008 & 1 \\ 0 & 1998 & 2003 & 0 \\ 0 & 2000 & 2005 & 0 \\ 2009 & 0 & 2013 & 2 \end{bmatrix} \Rightarrow \begin{bmatrix} 2017 & 0 & 2008 & 1 \\ 0 & 1998 & 2003 & 0 \\ 0 & 2 & 2 & 0 \\ 2009 & 0 & 2013 & 2 \end{bmatrix} \Rightarrow \begin{bmatrix} 2017 & 0 & 2008 & 1 \\ 0 & 0 & 5 & 0 \\ 0 & 2 & 2 & 0 \\ 2009 & 0 & 2013 & 2 \end{bmatrix} = A'$$

By rule 5 (textbook p.247), $\det(A)$=$\det(A')$. We can do cofactor expansion with respect to row2 to get the determinant:

$$\det(A) = \det(A') = 5(-1)^{2+3} \begin{vmatrix} 2017 & 0 & 1 \\ 0 & 2 & 0 \\ 2009 & 0 & 2 \end{vmatrix} = -20,250$$