Name:
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Date:

Dr. Clontz

MASTERY QUIZ DAY 29 Math 237 – Linear Algebra
Version 4 Fall 2017

Show all work. Answers without work will not receive credit. You may use a calculator, but you must show all relevant work to receive credit for a standard.

Standard G1.	Mark:

Compute the determinant of the matrix $\begin{bmatrix} 1 & 3 & 0 & -1 \\ 0 & 1 & 3 & 1 \\ 2 & 0 & 0 & -1 \\ 1 & -3 & -2 & -1 \end{bmatrix}$.

Solution:

$$\begin{aligned}
\det \begin{bmatrix} 1 & 3 & 0 & -1 \\ 0 & 1 & 3 & 1 \\ 2 & 0 & 0 & -1 \\ 1 & -3 & -2 & -1 \end{bmatrix} &= 2 \det \begin{bmatrix} 3 & 0 & -1 \\ 1 & 3 & 1 \\ -3 & -2 & -1 \end{bmatrix} - (-1) \det \begin{bmatrix} 1 & 3 & 0 \\ 0 & 1 & 3 \\ 1 & -3 & -2 \end{bmatrix} \\
&= 2 \left(3 \det \begin{bmatrix} 3 & 1 \\ -2 & -1 \end{bmatrix} + (-1) \det \begin{bmatrix} 1 & 3 \\ -3 & -2 \end{bmatrix} \right) + \left(1 \det \begin{bmatrix} 1 & 3 \\ -3 & -2 \end{bmatrix} - 3 \begin{bmatrix} 0 & 3 \\ 1 & -2 \end{bmatrix} \right) \\
&= 2 \left(3(-1) + (-1)(7) \right) + \left((1)(7) - 3(-3) \right) \\
&= 2(-10) + 16 \\
&= -4
\end{aligned}$$

□

Standard G3.	Mark:

Find the eigenspace associated to the eigenvalue -2 in the matrix $A = \begin{bmatrix} 2 & -3 & 2 \\ 8 & -9 & 5 \\ 8 & -7 & 3 \end{bmatrix}$

Solution: The eigenspace is spanned by $\begin{bmatrix} \frac{1}{4} \\ 1 \\ 1 \end{bmatrix}$.

□

Standard G4.	Mark:

Compute the geometric multiplicity of the eigenvalue 1 in the matrix $A = \begin{bmatrix} 8 & -3 & -1 \\ 21 & -8 & -3 \\ -7 & 3 & 2 \end{bmatrix}$

Solution: The eigenspace is spanned by $\begin{bmatrix} 3 \\ \overline{7} \\ 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ \overline{7} \\ 0 \\ 1 \end{bmatrix}$, so the geometric multiplicity is 2.

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Additional Notes/Marks	