Math 2210Q-008 - Applied Linear Algebra
Name: Sdn

Quiz 6
Fall 2018

Show ALL work to receive full credit.

1. In part (a), if the statement is always true, circle True. If the statement is sometimes false, circle False. In both parts, write a careful and clear **justification** or **counterexample**.

   (a) The determinant of $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 2 & 6 \\ 5 & 2 & 3 \end{bmatrix}$ is -10. (True) False

$$\begin{vmatrix} 0 & 0 & 1 \\ 0 & 2 & 6 \\ 5 & 2 & 3 \end{vmatrix} = -\begin{vmatrix} 5 & 2 & 3 \\ 0 & 2 & 6 \\ 0 & 0 & 1 \end{vmatrix} = -5 \cdot 2 \cdot 1 = -10$$

   (b) Justify the ***true*** statement: *If A is an $n \times n$ matrix, then*

$$\det(kA) = k^n \det(A).$$

kA multiplies every row of A by k
$\therefore$ $\det(kA) = k^n \det A$

2. Find the determinant of $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 0 & 4 \\ 0 & 5 & 6 \end{bmatrix}$ using a cofactor expansion ***across the first row***.

$$\det A = 1\begin{vmatrix} 0 & 4 \\ 5 & 6 \end{vmatrix} - 2\begin{vmatrix} 3 & 4 \\ 0 & 6 \end{vmatrix}$$
$$= -20 - 28 = -48$$

3. Find the determinant of $\begin{bmatrix} 1 & 2 & 0 \\ 3 & 0 & 4 \\ 0 & 5 & 6 \end{bmatrix}$ using a cofactor expansion ***down the second column***.

$$\det A = -2\begin{vmatrix} 3 & 4 \\ 0 & 6 \end{vmatrix} - 5\begin{vmatrix} 1 & 0 \\ 3 & 4 \end{vmatrix}$$
$$= -28 - 20 = -48$$

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1. In part (a), if the statement is always true, circle True. If the statement is sometimes false, circle False. In both parts, write a careful and clear **justification** or **counterexample**.

   (a) The determinant of $\begin{bmatrix} 0 & 0 & 1 \\ 0 & 2 & 6 \\ 5 & 2 & 3 \end{bmatrix}$ is -10. True False

   (b) Justify the ***true*** statement: *If A is an $n \times n$ matrix, then*

   $$\det(kA) = k^n \det(A).$$

2. Find the determinant of $\begin{bmatrix} 1 & 2 & 0 \\ 3 & 0 & 4 \\ 0 & 5 & 6 \end{bmatrix}$ using a cofactor expansion ***across the first row***.

3. Find the determinant of $\begin{bmatrix} 1 & 2 & 0 \\ 3 & 0 & 4 \\ 0 & 5 & 6 \end{bmatrix}$ using a cofactor expansion ***down the second column***.