Dawson College: Linear Algebra (SCIENCE): 201-NYC-05-S6: Winter 2016

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Quiz 7

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §2.3 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
If E is an elementary matrix, then $E\mathbf{x} = \mathbf{0}$ has only the trivial solution.

True,
$\det(E) \neq 0$ $\therefore$ by TFAE $E\mathbf{x} = 0$ has only the trivial solution.

Question 2. §2.3 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
If A is invertible, then $\operatorname{adj}(A)$ must also be invertible.

True,
Since A is invertible, $\det(A) \neq 0$
and $\det(\operatorname{adj} A) = (\det A)^{n-1} \neq 0$ since $\det A \neq 0$
$\therefore$ $\operatorname{adj} A$ is invertible since $\det(\operatorname{adj} A) \neq 0$

Question 3. §3.1 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
Two equivalent vectors must have the same initial point.

False,
by definition two vectors are equivalent iff they have the same direction and magnitude.

Question 4. §3.1 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
If $(a,b,c)+(x,y,z) = (x,y,z)$ then (a,b,c) must be the zero vector.

True,
$$(a,b,c) + (x,y,z) = (x,y,z)$$
$$(a+x, b+y, c+z) = (x,y,z)$$
$$\Rightarrow a+x = x,\ b+y = y,\ c+z = z \quad \Rightarrow a=0,\ b=0,\ c=0$$

Question 5. §2.3 #TF *(2 marks)* Determine whether the statement is true or false, and justify your answer.
If A and B are square matrices of the same size such that $\det(A) = \det(B)$, then $\det(A+B) = 2\det(A)$.

False,
Let $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ then $\det A = 1 = \det B$
and $\det(A+B) = \det(O_2) = 0 \neq 2\det A = 2$