Assignment 0

The due date for submitting this assignment has passed.
Due on 2020-09-14, 23:59 IST.

Note: This assignment is only for practice purposes and will not be counted towards the final score.

1. Consider the set $\mathbb{C}^n$ as a vector space over the field $\mathbb{R}$. Its dimension is
   - $n$
   - $2n$
   - $3n$
   - $n/2$
   - $n^2$

2. Let $Y$ denote the set of all real matrices of size $3 \times 3$. As a vector space over the field $\mathbb{R}$, it has dimension
   - 1
   - $8$
   - $9$
   - $81$

3. If $n$ is an integer, $a$ leaves remainder 7 upon division by 24 and an integer $b$ leaves remainder 14 upon division by 35 then the remainder of $ab$ upon division by $a$ is
   - $2$
   - $1$
   - $0$
   - Can't say

4. Suppose $f : X \rightarrow Y$ and $g : Y \rightarrow X$ are two functions such that $f \circ g$ is the identity function on $Y$. Then which of the following must hold?
   - $f$ is surjective
   - $f$ is injective
   - $g$ is surjective
   - None of these

5. The number of ways of arranging 6 distinguishable objects in a straight line is
   - 1
   - 6
   - 120
   - 720

6. Which of the following do not define an equivalence relation on the set of all integers?
   - $x - y \equiv 3(x - y)$
   - $x - y \equiv 3(x + y)$
   - $x - y \equiv 5(x + y)$
   - $x - y \equiv 3(x - y)$

7. Suppose $A$ is a matrix such that $A^3 = A$. Then which of the following must hold for $A$?
   - All three
   - Only 1
   - Only 2
   - None of these

8. Suppose $A$ is a matrix such that $A^2 = A$. Then which of the following must hold for $A$?
   - All three
   - Only 1
   - Only 2
   - None of these

9. For three square matrices $A$, $B$, and $C$ of the same size, which of the following must hold?
   - $tr(A + B) = tr(A) + tr(B)$
   - $tr(A - B) = tr(A) - tr(B)$
   - $tr(ABC) = tr(A) tr(B) tr(C)$
   - None of these