Major exam

Saturday 15th April, 2017

1. How many 4 digit decimal numbers are there such that 1 is not in the first place, 2 is not in the second, 3 not in third and 4 not in fourth? Prove.
2. What are the total number of passwords with at least 6 digits and at most 8 digits, with a condition that there must at least be one capital letter and one numeral. Prove your answer.
3. How many positive integer solutions are there for $x_1 + x_2 + x_3 < 10$. Explain.
4. Prove that there exists a k such that 11 divides $2^k - 1$.
5. Is it possible to an example of a relation which is not a function. Explain.
6. Show that for every bijection function f, there exists an inverse.
7. Given two finite sets A, B, we say that $A \times B = B \times A$ iff _____ ?
8. (Give an exercise problem from the text book which is on the stirling's number of the first kind. Note that it is not second kind).
9. Is complement of a Tree with more than 4 vertices always connected? Give reason for your answer.
10. A tree has a Hamilton Path iff _____
11. How many non-isomorphic induced subgraphs does K_6 have?
12. Derive the chromatic polynomial of a cycle on 5 vertices?
13. Write a statement that is equivalent to $p \rightarrow q$ and prove it with the help of a truth table.
14. How do you check the divergence of an infinite sequences using quantifiers? Explain.
15. What is the rook polynomial of a 3 X 3 chess board? Explain.
16. Six married couples are to be seated at a circular table. In how many ways can they arrange themselves so that no wife sits next to her husband.
17. Assignment question
18. Assignment question
19. Assignment question
20. Assignment question