

Name &amp; Affiliation: .....

1. Solve the recurrence relation  $T(n) = T\left(\frac{n}{2}\right) + 2$ , with  $T_1 = 1$ . You may use big O notation in the answer. 2
  
2. A team of five students is to be selected from a class that has ten boys and twenty girls. In how many ways can it be done so that 2
  - (i) the team contains exactly two boys?
  
  - (ii) Ahana and her friend Meher (both girls) are in the team?
  
3. Write the negation of the following sentence : **The train is late or my watch is fast.** 1
  
4. Show that  $\neg p \rightarrow (p \rightarrow q)$ . 1.5
  
5. A student writes an exam that have five questions, of one mark each. The questions are multiple choice, with four choices for each question. Only one choice is correct. If she picks one answer at random for each question in such a way that and all the four answers are equally likely to be selected, what is the probability that she will get at least one answer right? 1.5
  
6. Prove using mathematical induction :  $1 + 4 + 7 + 10 + \dots + (3n - 2) = \frac{n}{2}(3n - 1)$ , for all  $n \geq 1$ . 2  
(You may use backside)