CS222: Assignment 5 - Multiplication and Repeated Squaring

1. Submission deadline: Sunday, 7 March at 11:59 pm.
2. Follow good coding practices to gain more marks.
3. No copying among the students or from the Internet or any other source.
4. The assignment can be submitted in groups of size ≤ 3.
5. Submit a `.cpp` file and one `.pdf` file.
6. Write the names and roll numbers of the students at the top of each file.
7. The files should be called

   `arithmetic1_firstRollNumber_secondRollNumber_thirdRollNumber.cpp`,

   `arithmetic1_squaring_firstRollNumber_secondRollNumber_thirdRollNumber.pdf`.
8. The pdf should contain the output obtained when each program was run and the answers to the questions asked.
9. Saina Sunny (saina19231102@iitgoa.ac.in@iitgoa.ac.in) will be your TA for this assignment.
10. The last algorithm in `http://people.cs.uchicago.edu/~laci/HANDOUTS/repeated-squaring.pdf` is the one referenced in this assignment.

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1. (a) Implement a recursive function `multiply(x, y)` that takes two non-negative integers x and y and computes xy using the method given in the class. `https://www.youtube.com/watch?v=WE3J9ptVuA0&list=PL18Wj2fHZoevNaBQ-LK601Gq-9q4InNaG&index=15`

   (b) Implement a recursive function `exponential(a, b)` that takes two positive integers a and b and computes a^b using the *second* repeated squaring method given in the class. `https://www.youtube.com/watch?v=zj12bRq2kvA&list=PL18Wj2fHZoevNaBQ-LK601Gq-9q4InNaG&index=13`

   (c) In the main method, the program takes inputs a, b, c, d from the user and outputs $a^b c^d$. The main method calls the functions `multiply(x, y)` and `exponential(a, b)` described above.

   (d) In the pdf, write a sample output. Also write the time complexity of the functions `multiply(x, y)` and `exponential(a, b)`.