CS6235 Quz 1 Exam: Feb 21 2025
Maximum marks = 55, Time: 50 min

Name: _____ Roll: _____

- Advise: work out each question succinctly and legibly.

- A question with X marks will approximately take X minutes. Plan accordingly.

- Start the answer for each question on a new page.

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1. **Alias analysis** [11 marks] In the context Java, define alias analysis [1 mark]. Give examples that show three different uses of alias analysis. [10 marks]

2. **Inter-procedural analysis** [11 marks] Briefly differentiate the difference between context sensitive and insensitive analysis. Give example Java programs, which show that (i) context-sensitive points-to analysis is in general more precise than context-insensitive analysis. (ii) context-insensitive analysis can sometimes have the same precision as that of context-sensitive analysis. [5+5 marks]

3. **Intra-procedural analysis** [11 marks] Draw the constant propagation lattice [1 mark]. Write a Java function, such that if you apply the constant propagation algorithm, it will process at least one of the nodes four times, to reach fixed-point [5 marks]. Show the progress of the constant propagation algorithm. [5 marks]

4. **Happens Before and MHP** [11 marks]. Define the five HB relation rules [5 marks]. Which of the following relation is true about HB: (i) commutative, (ii) transitive [1 marks]. Write a Java program to show the usage of all the above five rules to compute the HB relation [5 marks].

5. **Potpourri** [6 marks]

   - Draw the lattice for reaching definitions. [2 marks]

   - Write a Java function and its CFG, such that the CFG has a node which is both a branch node and join node. [2 marks]

   - In a parallel Java program, we may not be able to perform strong updates (say, to a store statement of the form `x.f = y`), even if `x` points to a singleton set of abstract objects. True of False - justify [2 marks].