Homework 1

Due : August 1st, 2018

- 1. Fill in the blanks. Let a, b, c be real numbers. The equation $x^2 + bx + c = 0$ has exactly one solution when, and it has no solutions when
- 2. On July 24th, 2018, the *Indian Slow coach* reported that the Indian Statistical Institute was awarding 25% more B.Math (Hons.) degrees than the economy could absorb. The headline concluded that there was 1 in 4 chance of underemployment¹. What should the correct statement of the odds have been ?
- 3. Let a, b, c, d be real numbers with a < b < c < d. Express the set $[a, b] \cup [c, d]$ as the difference of two sets.
- 4. Determine the set of ordered pairs (x, y) of non-zero real numbers such that $\frac{x}{y} + \frac{y}{x} \ge 2$.
- 5. Given several piles of 1 Rupee coins from the ISI-Canteen cashier, we create a new collection by removing one coin from each old pile to make a new pile. Each original pile shrinks by one. That is, for example: if the original collection had four piles of 1,1,2,5 then the new set of piles will have 1,4,4. Which lists of sizes (order is not important) are unchanged under this operation ?

(Need not turn in) Practice Problems for writing skills:

- Which natural numbers are sums of consecutive smaller natural numbers ?For e.g: 15 = 4 + 5 + 6.
- An ordinary chess-board has 204 squares in total. How many squares of all sizes are there in an $n \times n$ "chess-board"? How many triangles of all sizes arise using a triangular grid with sizes of



length n?

¹means having no job or having a job not requiring the B.Math (hons.) degree