Examination 2

CS 336

1. The important issue is the logic you used to arrive at your answer.
2. Use extra paper to determine your solutions then neatly transcribe them onto these sheets.
3. Do not submit the scratch sheets. However, all of the logic necessary to obtain the solution should be on these sheets.
4. Comment on all logical flaws and omissions and enclose the comments in boxes

1. [20] Using only Definition 2', show that the set of odd integers (i.e., {…, -3, -1, 1, 3, …} is infinite**.**

2. [20] Suppose the set U is uncountably infinite, the set V is countable and W is the set difference $U \sim V$. Prove or disprove (with a simple counter example):

W is uncountably infinite.

3. [20] Prove that the set of complex numbers $C = \{x + iy \mid x, y \in \mathbb{R}\}$ is uncountably infinite.

4. [20] Using only Definition 1, prove that $1 + 2n + 3n^2 = \mathrm{O}(n^2)$.

5. [20] Given that a function $f : \mathbb{N} \to \mathbb{R}$ assumes only positive values (i.e., $f(n) > 0$ for all $n \in \mathbb{N}$) and that $f^2 = \mathrm{O}(f)$ prove that $f = \mathrm{O}(1)$.

6. **[20]** Prove that for $0 < a < 1, a^n \neq \mathrm{O}(a^{2n})$.