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

[20] Using only Definition 2', show that the set of positive odd integers (i.e., 1, 3, 5, …) is infinite.

2. **[20]** Suppose the sets A is uncountably infinite and B is nonempty, prove that the set $A \times B$ is uncountably infinite.

3. **[20]** Show that the set P of all computer programs in language X is a countable set. For this, assume
a. that the set A of characters that can be used for programs in X is finite,
b. that all programs consist of finitely long strings of characters from A, and
c. that the set of programs is a subset of these finitely long strings that obey some collection of syntax rules.

4. **[20]** Using only Definition 1, prove that if then $n^3 = O(n^5)$

5. **[20]** Suppose $f : N \to \Re$ is the polynomial $f(n) = \sum_{i=0}^{k} a_i n^i$. Prove that $f = O(n^k)$.

6. **[20]** Using the Definition 2, prove that $n^3 \neq o(10n^3)$.