CSCE 235 **Feb 2, 01**

Quiz #2

(0 points) Name: ..... (0 points) SSN: .....

Do **All** of the following questions and show your work.

Question 1: (3 points) Let A be a subset of $\mathbb{N} \times \mathbb{N}$ with the properties:

(a) $(1, 1) \in A$ and

(b) $(a, b) \in A \longrightarrow (a + 1, b)$ and $(a + 1, b + 1)$ are both in A.

Let $B = \{(m, n) \in \mathbb{N} \times \mathbb{N} \mid m \geq n\}$.

Is $B \subseteq A$?

Question 2: (5 points) Let $\{u_n\}_{n=1}^{\infty}$ be defined by

$$u_n = \frac{2}{3} - (\frac{1}{6})(\frac{1}{4^{n-2}}), \forall n \in \mathbb{N}.$$

Let $A = (-5, \frac{11}{3}] \cap [\frac{7}{4}, 5) \cap \mathbb{Z}^+$ and let $S = A - \{-4, 7\}$. Find

$$\Sigma_{i \in S}\ u_i$$

.

Question 3: (6 points) Prove by mathematical induction:

$$(1+2+3+...+n)^2 = 1+2^3+...+n^3, \forall n \in \mathbb{N}.$$

Question 4: (6 points) Let

$$A = \{(-1,2),(4,5),(0,0),(6,-5),(5,1),(4,3)\}$$

$$B = \{b \mid b = k^2 \text{ for some } k \in \mathbb{Z} \text{ and } (a,b) \in A \text{ for some } a\}.$$

$$C = \{x-4 \mid x \in Z \text{ and } \tfrac{-157}{7x^2-35x+42} \geq 0\}.$$

Find $(C \cup B) \cap \{\{-3,1,2\},\{1\},0,5,4,\{2\},\{0\},-2,-1,\phi\}$.