

Open brain, closed book/notes. Please write four short essays. Write in complete, grammatical, correctly-spelled English sentences.

QA1: Let K be the smallest integer such that

$$*: \quad \forall n \in [K.. \infty) : \quad 3^n > 50 + 2^n.$$

Then $K =$ _____.

On your own sheets of paper, write a careful induction proof of (*), using your value of K .

Little essays. On your own sheets of paper, write a careful definition of each the following three statements. You may freely use the symbols $\mathbb{Z}, \mathbb{N}, \mathbb{Q}, \mathbb{R}, \exists, \forall$ and the symbols $\cdot, +, -, =, \neq$. You may also use the “divides” \mid symbol.

You must not use the words: reduces, splits, factor, divisor, divides, unique, only etc..

QA2: Give a fully-quantified definition of the statement: “There is no largest integer.”

QA3: Give a fully-quantified definition of the statement: “The natnum 675 is irreducible in \mathbb{N} .”

QA4: Give a fully-quantified definition of the statement: “The natnum 675 is prime in \mathbb{N} .”

No equivalence-relations were harmed in the making of this quiz.

QA1: _____ 20pts

QA2: _____ 15pts

QA3: _____ 15pts

QA4: _____ 15pts

Total: _____ 65pts

Please PRINT your *name* and *ordinal*. Ta:

Ord: _____

HONOR CODE: “I have neither requested nor received help on this exam other than from my professor.”

Signature: _____