Staple!

Sets and Logic MHF3202 2787	**Class-W**	Prof. JLF King 31Aug2015

W4:	___ ___	80pts
W5:	___ ___	50pts
Total:	___ ___ ___	130pts

W4: Short answer. Show no work.

Please write **DNE** in a blank <u>if</u> the described object does not exist or if the indicated operation cannot be performed.

___ ___ a) For $G := \{1,2,3,4\}$, consider $f{:}G \to \mathcal{P}(G)$ by

$$f(1) := \{3,4\}, \qquad f(2) := G,$$
$$f(3) := \varnothing, \qquad f(4) := \{1,4\}.$$

The set $B := \{x \in G \mid f(x) \not\ni x\}$ is $\{$ .... $\}$.

___ ___ b) An explicit bijection $F{:}\mathbb{N}\times\mathbb{N} \hookrightarrow\!\!\!\!\rightarrow [-4 .. \infty)$ is $F(n,k) :=$ ....

___ ___ c) An explicit bijection $F{:}\mathbb{N} \hookrightarrow\!\!\!\!\rightarrow \mathbb{Z}$ is this:

When n is *even*, then $F(n) :=$ ....

When n is *odd*, then $F(n) :=$ ....

___ ___ d) Both $\sim$ and $\bowtie$ are equiv-relations on a set Ω. Define binrels $\mathbf{I}$ and $\mathbf{U}$ on Ω as follows.

Define $\omega \,\mathbf{U}\, \lambda$ IFF <u>*Either*</u> $\omega \sim \lambda$ <u>*or*</u> $\omega \bowtie \lambda$ [or both].

Define $\omega \,\mathbf{I}\, \lambda$ IFF <u>*Both*</u> $\omega \sim \lambda$ <u>*and*</u> $\omega \bowtie \lambda$.

So "**U** *is an equiv-relation*" is: *T* *F*

So "**I** *is an equiv-relation*" is: *T* *F*

OYOP: *In grammatical English* ***sentences****, write your essay on every* ***third*** *line* (usually)*, so that I can easily write between the lines. Do* <u>**not**</u> *restate the question.*

W5: Interval-of-integers $\mathbf{J} := [101 .. 200)$ has 99 elements. A subset $S \subset \mathbf{J}$ is ***Big*** if $|S| = 51$. Subset $S \subset \mathbf{J}$ is ***Perfect*** if there exist *distinct* members $x,y \in S$ st. $x + y = 300$.

Prove that Big $\Rightarrow$ Perfect. [*Hint:* PHP. <u>*Carefully*</u> specify what your pigeon-holes are.]

End of Class-W