Sets and Logic
MHF3202 7860

Class-X

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X4:	___ ___ ___	115pts
X5:	___ ___	50pts
Total:	___ ___ ___	165pts

X4: 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** The author of our text is [Circle]: **DNE**
Archimedes Euler Fuchs Gauss Machen Mendez Mueller Silverman Vaughn Velleman Whittle Zeitz

___ ___ **b** Mimicking what we did in class: From the 300×200 gameboard, cut-out (remove) the $(35, 150)$-cell and one other cell at $P = (x, y)$. [Circle] those choices for P,

$(150, 160)$, $(14, 35)$, $(66, 77)$, $(195, 15)$, $(123, 4)$

which, if removed, would leave a board that *definitely* can**<u>not</u>** be domino-tiled.

___ ___ **c** Both $\sim$ and $\bowtie$ are equiv-relations on a set Ω. Define binrels **I** and **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*

___ ___ **d** Let $\mathcal{P}_\infty$ denote the family of all *infinite* subsets of $\mathbb{N}$. Define relation $\approx$ on $\mathcal{P}_\infty$ by: $A \approx B$ IFF $A \cap B$ is infinite.
Stmt "*This* $\approx$ *is an equivalence-relation*" is: *T* *F*

___ ___ **e** LBolt: $\text{Gcd}(70, 42) =$ ______ $\cdot 70 +$ ______ $\cdot 42$.

So (LBolt again) $G := \text{Gcd}(70, 42, 60) =$ ______ and ______ $\cdot 70 +$ ______ $\cdot 42 +$ ______ $\cdot 60 = G$.

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.* Start each essay on a <u>new</u> sheet-of-paper. Please number the pages "1 of 57", "2 of 57"... (or "1/57", "2/57"...) I suggest you put your name on each sheet.

X5: On a 7×7 chessboard, 22 rooks are placed. Prove there exists a ***friendly*** 4-set of rooks. [I.e, on 4 distinct rows and on 4 distinct columns.] [*Hint:* PHP] Illustrate the concepts in your proof with *large*, *useful* Pictures.

End of Class-X