Sets and Logic MHF3202 | **SeLo-B** | Prof. JLF King *Touch*: 17Nov2018

B1: A posint N is ***perfect*** IFF [Defn] ....

....

....

THM: *An even posint N is perfect IFF* (state the thm) ...

....

....

(This thm is credited to .... and ....)

Applying the theorem, the 3[rd] even perfect number equals $A \cdot B$ where A= .... and B= ....

B2: *Essay, on your own paper, triple-spaced:* For a posint K, let $\equiv$ mean $\equiv_K$. DEFN: Expression "$x \equiv y$" means. . . .

Please prove: THM: *For all $b, \beta, g, \gamma \in \mathbb{Z}$, if $b \equiv \beta$ and $g \equiv \gamma$ then $[b \cdot g] \equiv [\beta \cdot \gamma]$.*

B3: Show no work.

Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

___ ___ a) Posints K= ..... , N= ..... , α= ..... , β= ..... , are st. $\alpha \equiv_K \beta$, yet N^α= ..... is **not** $\equiv_K$ to N^β= ..... .

___ ___ b) Using *only* symbols $\boldsymbol{H}$, $\boldsymbol{D}$, $\wedge$, $\vee$, $\neg$, T, F,], [, rewrite (in simplest form) expression $[[H \Rightarrow D] \Rightarrow H]$ as .... Ditto, rewrite $[H \Rightarrow [D \Rightarrow H]]$ as ....

___ ___ c) Rewrite $x \in \left[F \cup [\bigcap_{k \in B} G_k]\right]$ without $\cup, \cap$, by using $\boxed{\forall: \exists \text{st.} \in\ni \vee\&, \textit{letters}}$ as ....

Rewrite $x \in \bigcup_{j \in A} [F_j \cup [\bigcap_{k \in B} G_k]]$ as

....

___ ___ d$^+$) Let B:=105, M:=81, T:=9. Cgr $B \cdot x \equiv_M T$ has *reduced Cgr* $\beta \cdot y \equiv_\mu \tau$, where β= .... ,

μ= .... , τ= .... , and soln y= .... $\in [0 .. \mu)$.

Cgr $B \cdot x \equiv_M T$, has .... many solns, which are x= .... $\in [0 .. M)$.

e) $\boldsymbol{\tau}(9^{23})$= .... and $\boldsymbol{\sigma}(9^{23})$= ....

And Euler $\varphi(25 \cdot 16900)$ = ...

Express your answer as a product $p_1^{e_1} \cdot p_2^{e_2} \cdot \ldots$ of *primes* to posint powers, with $p_1 < p_2 < \ldots$.

End of SeLo-B

B1:	___ ___	45pts
B2:	___ ___	45pts
B3:	___ ___ ___	105pts
Total:	___ ___ ___	195pts

Print name .... Ord:

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

Signature: ....