Number Theory MAS4203 | **Class-A** | Prof. JLF King 31Aug2015

Open brain, closed book/notes. Use $\varphi()$ for the Euler phi-fnc. Essays violate the CHECKLIST at *Grade Peril*!

A5: Short answer: Show no work. Please write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

z The author of our text is *Circle*: **Archimedes** **Wiles** **DNE** **Silverman** **LeVeque** **Euler** **Machen**

a^{++} $N := \varphi(100)=$ ______ . So $\varphi(N)=$ ______ .
EFT says that $3^{1621} \equiv_N$ ______ $\in [0..N)$. Hence (by EFT) last two digits of $7^{[3^{1621}]}$ are ______ .

b This $n=$ ______ is a SOTS in two really different ways:
$n =$ ______$^2 +$ ______$^2 =$ ______$^2 +$ ______^{2}.
(Use four distinct posints.)

c Mod K:=50, the recipr. $\langle \frac{1}{21} \rangle_K =$ ______ $\in [0..K)$.
[*Hint:* ↯] So $x=$ ______ $\in [0..K)$ solves $4 - 21x \equiv_K 1$.

d^+ Define G:[1..12]↺ where $G(n)$ is the number of letters in the n^{th} Gregorian month. So $G(2) = 8$, since the 2^{nd} month is "February". The only fixed-point of G is ______ . The *set* of posints k where $G^{\circ k}(12) = G^{\circ k}(7)$ is ______ .

e Three Jacobi symbols: Two blanks are immed.: $\left(\frac{4203}{2006}\right)=$ ______ . $\left(\frac{120}{27113}\right)=$ ______ . $\left(\frac{4203}{99}\right)=$ ______ .

A6: Please state Wilson's Thm. Now give a careful detailed (*Daniel!*) proof. [Bonus for Legendre-Symbol Theorem]

No quadratic residues were harmed in the making of this exam.

A-Home:	___ ___ ___	295pts
A5:	___ ___ ___	105pts
A6:	___ ___	55pts
Total:	___ ___ ___	455pts

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: ______