Number Theory
MAS4203 8430

Bonus-B′

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Touch: 2Jul2018

Open brain, **open** book/notes and calculator.
This is due at the beginning of class on **Monday, 09Apr2007**.

B′6: Short answer: Show no work. Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

a Consider the four congruences C1: $z \equiv_{34} 18$, C2: $z \equiv_{51} 1$, C3: $z \equiv_{35} 27$ and C4: $z \equiv_{22} 8$. Let z_j be the *smallest natnum* satisfying (C1) $\overset{\text{All}}{\wedge}$ (Cj). Then

$z_2=$; $z_3=$; $z_4=$.

b Let $N := 15$. In std. form, this cyclo-poly

$\mathbf{C}_N(x)=$.

c Let $N := 5662!$ (factorial). Written in base-10, this N ends in many zeros?

d The eight solns to $\boxed{x^{3304} \equiv_{1217} 476}$ are: (Write each in $[0\,..\,1217)$, in order $a < b < \cdots < h$.)

$x =$.

[*Hint:* The numbers $3, 5, 6, 7$ are each mod-1217 primroots.]

e Modulo 187, the multiplicative-order of 87 is . [*Hint:* $\varphi(187)$ has very few prime factors.]

End of Bonus-B′

B′6: ___ ___ 50pts

Total: ___ ___ 50pts

Print name Ord:

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

Signature: