Numbers & Polys
MAS3300

Exam-T

Prof. JLF King
Touch: 17Nov2017

Note. This is an open brain, open (pristine) Sigmon-Notes exam. Please write each solution on a separate sheet of paper. Write expressions unambiguously e.g, "$1/a+b$" should be bracketed either $[1/a]+b$ or $1/[a+b]$. (Be careful with **negative** signs!) Every "**if**" must be matched by a "**then**".

T1: 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.

z The author of our text is *Circle*: **Archimedes** **Machen** **DNE** **Bogart** **Sigmon** **Euler**

a The number $\frac{16}{27}$ has these two base 3 numerals: N_1= ____ ; N_2= ____ .

b+ Compute $D := \text{Gcd}(321, 51)$= ____ (via ↯, Euclid.Alg), and integers S= ____ and T= ____ satisfying $321S + 51T = D$.

c+ Repeating decimal $0.7\overline{43}$ equals $\frac{n}{d}$, where posints $n \perp d$ are n= ____ and d= ____ .

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

e Define G:[1 .. 12]↻ where $G(n)$ is the number of letters in the n^{th} Gregorian month. So $G(2) = 8$, since the 2nd 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 ____ .

[January, February, March, April, May, June, July, August, September, October, November, December]

T2: Consider a commutative ring $(\Gamma, +, 0, \cdot, 1)$,

i OSSOPPlease finish these sentences: "An elt $z \in \Gamma$ is a ***zero-divisor*** if..." "A $u \in \Gamma$ is a ***unit*** if...".

ii Prove that no zero-divisor is a unit.

T3: Prove that there is **no** rational $\frac{n}{d}$ whose square is 12.

Bonus: Write the set of COMPOSITES using set-builder notation.

T1:	___ ___ ___	120pts
T2:	___ ___	80pts
T3:	___ ___	80pts
Bonus:	___ ___	15pts
Total:	___ ___ ___	280pts

Ordinal:

Print name ____ Ord:

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

Signature: ____

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