

Algebra 1 Prof. JLF King
 MAS4301 3175 **In-class-A** Monday 03Feb2003

A6: ____ 90pts

A7: ____ 30pts

A8: ____ 60pts

Total: ____ 180pts

Note. Open brain, closed book/notes. Use $\varphi()$ for the Euler phi-fnc. Use “ $f(x)$ notation” when writing fncs; in particular, for trig and log fncs. E.g, write “ $\sin(x)$ ” rather than the horrible $\sin x$ or $[\sin x]$. Write expressions unambiguously e.g, “ $1/a + b$ ” should be bracketed either $[1/a] + b$ or $1/[a + b]$. (Be careful with **negative** signs!)

A6: Show no work.

z Professor King sometimes gives freebie questions.
Circle one: **True** **Right On!** **Who?**

a $\varphi(7000) =$ _____
 Express your ans. as a product $a \cdot b \cdot c \cdot \dots \cdot z$.

b A posint N is st. $\Phi(N)$ is cyclic. Using $\varphi()$, group $\Phi(N)$ has _____ many generators.

c The 15-puzzle can legally move between the two positions shown on the blackboard: **Circle** one: **True** **False**

d A permutation has cycle-lengths 35, 7, 5, 4, 4, 4, 6, 6, 6, 6 and is therefore an **Circle** one: **Even** **Odd** permutation.

e Group $(\mathbb{Z}_{8100}, +, 0)$ has _____ many subgroups?; express your answer as a product. [Hint: $81 = 3^4$.]

HONOR CODE: “I have neither requested nor received help on this exam other than from my professor (or his colleague).”

Name/Signature/Ord

Ord: _____

Essay questions

Please write (on your own paper) in complete grammatical sentences.

A7: Give, with proof, a finite group M where $\text{Aut}(M)$ is strictly larger than $\text{Inn}(M)$.

A8: Prove or disprove: Multiplicative groups $G := \Phi(20)$ and $H := \Phi(24)$ are isomorphic.