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FACULTY OF MATHEMATICS AND NATURAL SCIENCES

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MIDTERM 1
MAA 209 - Number Theory
International Mathematics Education 2011
19 April 2012
OPEN BOOKS

1. Let $a = 114$ and $b = 93$. Determine the integer solution of Diophantine equation

$$ax + by = 600.$$

2. Verify that if an integer is simultaneously a square and a cube (as in the case with $64 = 8^2 = 4^3$), then it must be either of the form $7k$ or $7k + 1$.
3. Iyan has opened a bank account for which there are no charges and yielding a yearly 4% interest which is computed and paid to his account every third month. Suppose Iyan deposited a certain amount of money when he opened the account and after that he neither withdrew nor deposited money from the account. What is the recurrence relation determining amount of money Iyan has in his account after n years?
4. Use Mathematical Induction to prove that if the set S has n elements, then $P(S)$ has 2^n elements.
Note: $P(S)$ is the collection of all subsets of S , for example if $S = \{a, b\}$ then $P(S) = \{\phi, \{a\}, \{b\}, \{a, b\}\}$.
(Hint: use the Binomial Theorem)

Academic dishonesty will not be tolerated
~DO YOUR BEST~