Indian Journal
of Mathematics
Volume 57, No. 2, 2015

CONTENTS

Abstract: Let a and b be positive integers. A Lucas sequence $(C_n)_{n\geq 0}$ is defined by the recurrence $C_{n+2} = aC_{n+1} + bC_n$ for all $n \geq 0$, where $C_0 = 0$ and $C_1 = 1$. For $a = b = 1$, $C_n = F_n$ is the well-known Fibonacci sequence. In 2000, F. Luca proved that $F_{10} = 55$ is the largest repdigit (i.e., a number with only one distinct digit in its decimal expansion) in the Fibonacci sequence. In this article, we show that if the number of digits m in the repdigit is at least as large as a, then, for $2 \leq a$ and $1 \leq b \leq a$, there are no such repdigits in $(C_n)_{n\geq 0}$ when $a > 2.9 \times 10^{17}$. Additionally, in the special case of $b = 1$, we prove that there are only two occurrences of repdigits in $(C_n)_{n\geq 0}$ with $2 \leq a \leq 150000$ and $1 \leq m \leq 2.9 \times 10^{17}$, other than when a itself is a repdigit and $n = 2$.

Abstract: The rule of trajectory structure for fourth-order nonlinear difference equation

$$x_{n+1} = \frac{x_{n-2}x_{n-3}^b + 1}{x_{n-2} + x_{n-3}^b}, \quad n = 0, 1, 2, \ldots,$$

where $b \in [0,1)$ and the initial values $x_{-3}, x_{-2}, x_{-1}, x_0 \in [0,\infty)$, is described clearly out in this paper. Mainly, the lengths of positive and negative semi-cycles of its nontrivial solutions are found to occur periodically with prime period 15. The rule is $4^-, 3^+, 1^-, 2^+, 2^-, 1^+, 1^-, 1^+$ in a period. By utilizing this rules its positive equilibrium point is verified to be globally asymptotically stable.

Abstract: In the present paper, we study the convergence of the Gauss-Newton-type method introduced by Rashid et al. [M. H. Rashid, S. H. Yu , C. Li and S. Y. Wu, Convergence Analysis of the Gauss-Newton-type Method for Lipschitz–like Mappings, J. Optim. Theory Appl. 158(2013), no. 1, 216-233.] for solving generalized equation defined by the sum of differentiable function and set-valued mapping acting in Banach spaces, when the Fréchet derivative of the differentiable function satisfy Hölder condition. In particular, we analyze the semilocal and local convergence of the Gauss-Newton-type method under the assumption that the Fréchet derivative of the differentiable function is Hölder continuous.

Abstract: In this paper, we establish several modular relations for Ramanujan's continued fraction $X(q)$ of order six and we study 2- and 4-dissections of the continued fraction $X^*(q) := q^{-\frac{1}{4}}X(q)$. We also show that, when $X^*(q)$ and its reciprocal are expanded as power series, the sign of the coefficients are periodic with period 2 and 6

respectively.

Abstract: A class of spaces called weakly densely normal spaces which lies in between densely normal spaces and κ-normal spaces is introduced and studied. Some decompositions of normality has been provided via this notion of generalized dense normality in terms of β-normality and seminormality.

Abstract: In this paper, we first establish a fixed point theorem for continuous mapping in Hausdorff space satisfying a general contractive inequality of integral type. Secondly, we obtain some fixed point theorems for mappings satisfying a general contractive inequality of integral type in complete metric spaces. The obtained results are an extension of the theorem of Branciari (2002) and the theorems of Samet and Yazidi (2011).

Abstract: Here we research the univariate quantitative approximation of real and complex valued continuous functions on a compact interval or all the real line by quasi-interpolation, Baskakov type and quadrature type neural network operators. We perform also the related fractional approximation. These approximations are derived by establishing Jackson type inequalities involving the modulus of

continuity of the engaged function or its high order derivative or fractional derivatives. Our operators are defined by using a density function induced by the error function. The approximations are pointwise and with respect to the uniform norm. The related feed-forward neural networks are with one hidden layer.

****