1064-20-204 **kenneth W johnson*** (kwj1@psu.edu), Math Department, PSU Abington, 1600 Woodland Road, Abington, PA 19001. *On the existence of simple loops with two non-trivial conjugacy classes.* Preliminary report.

The Paige loop of order 120 has conjugacy classes of orders $63 = (2^3 - 1)(2^3 + 1)$ (containing elements of order 2) and $56 = (2^3 - 1)2^3$ (containing elements of order 3). The question of whether this loop is part of a series of simple loops $Q(n)$ or order $2^n(2^{n+1} - 1)$ with exactly two non-trivial conjugacy classes of sizes $(2^n - 1)2^n$ and $(2^n - 1)(2^n + 1)$ may be interesting to examine. There is no such $Q(2)$. This uses the GAP list of primitive groups and the Nagy program which constructs a loop transversal. For $n = 3$ the Paige loop is the only loop with such classes. If $Q(4)$ exists it has order $496 = 16.31$ and classes of orders 240 and 255. There are two primitive groups of degree 496 with suborbits of size 240 and 255.

It seems more likely that a loop would exist for $n = 5$ of order $32.63 = 2016$ with classes of order $31.32 = 992$ and $31.33 = 1023$. There are two primitive permutation groups of degree 2016 with suborbits of orders 992 and 1023, of orders $50027557148216524800 = 2^{30}.3^8.5^2.7^2.11.17.31$ and $100055114296433049600 = 2^{31}.3^8.5^2.7^2.11.17.31$. (Received September 09, 2010)