PROBLEM OF THE WEEK

Solution of Problem No. 4 (Fall 2001 Series)

Problem: Evaluate $S_n = \sum_{k=0}^{n} (-1)^k \binom{3n}{k}$ for $n = 1, 2, \cdots$.

Solution (by Eric Tkaczyk, Jr. EE and MA)

$$S_n = \sum_{k=0}^{n} (-1)^k \binom{3n}{k} = \sum_{k=0}^{n} (-1)^k \left[\binom{3n-1}{k-1} + \binom{3n-1}{k} \right]$$

(by Pascal's triangle, defining $\binom{n}{-1} = 0, \forall n \in \mathbb{Z}$), a telescoping sum! Hence

$$S_n = (-1)^n \binom{3n-1}{n}.$$

Also solved by:

<u>Undergraduates</u>: Haizhi Lin (MA), Stevie Schraudner (Sr. CS/MA)

<u>Graduates</u>: Tamer Cakici (ECE), John Hunter (MA), Dave Keshavdas (EE), Sravanthi Konduri (CE), Ashish Rao (EE), B. N. Reddy Vanga (Nucl E), K. H. Sarma (Nucl E), Amit Shirsat (CS), D. Subramanian & P. Ghosh (CHME)

<u>Faculty</u>: Steven Landy (Phys. at IUPUI)

<u>Others</u>: Michael Hamburg (Sr. St. Joseph's H.S., South Bend), Jonathan Landy (Warren Central H.S., Indpls), Rob Pratt (Gr. U.N.C., Chapel Hill, NC), Mr. Rice's class (East Tipp. Middle Sch., Laf)