SOLUTIONS

No problem is ever permanently closed. Any comments, new solutions, or new insights on old problems are always welcomed by the problem editor.

152. [2004, 130; 2005, 201–202] *Proposed by Joe Flowers and Doug Martin (student), Texas Lutheran University, Seguin, Texas.*

Let

$$F(s) = L[f(t)] = \int_0^\infty e^{-st} f(t)\, dt$$

denote the Laplace transform of $f(t)$. Find $L[\sin^n bt]$, where b is any real constant and n is any non-negative integer.

Also solved by Kenneth B. Davenport, Dallas, Pennsylvania.

153. [2005, 52] *Proposed by Joe Howard, Portales, New Mexico.*

Let $n \geq 2$ be an integer. Prove that

$$n^n > (n+1)^{n-1} + \frac{n}{n+1}.$$

Solution by Thomas P. Dence, Ashland University, Ashland, OH. The inequality is clearly true for $n = 2$. Since

$$\frac{n}{n+1} < 1$$

and $n^n, (n+1)^{n-1} \in \mathbb{N}$, then it suffices to show that

$$n^n \geq (n+1)^{n-1} + 1$$

or equivalently,

$$n^n > (n+1)^{n-1}$$

for all $n \geq 3$. But this is true if and only if

$$\frac{n^n}{(n+1)^{n-1}} > 1$$