

## HOW HE SEES IT

# Mathematics is alive and well at YSU



**Zbigniew Plotrowski**


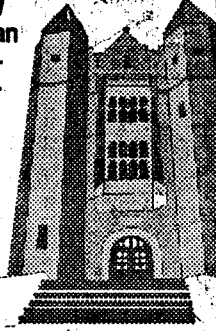
According to D.J. Price, the number of scientific papers published annually has been doubling every 10 to 15 years for the last two centuries. Similar growth has also occurred in mathematics.

In 1870 there were only 840 papers published in mathematics. Today, about 50,000 papers are being published annually. A significant number of them are being published by university professors. Surprised? I bet some of you might have thought that all we do is teach calculus.

**Pure mathematics:** Many of these articles come from the so-called "pure" mathematics. Let me now throw in another number. According to the late Professor Hugo Steinhaus, only about 5 percent to 10 percent of these pure mathematics articles will have any applications in real life. The Catch 22 is, we do not know which of them will be applicable.

**SCHOLAR'S VIEW**

■ **DR. ZBIGNIEW PIOTROWSKI** is an associate professor of mathematics at Youngstown State University.

This is one of a series of bi-weekly commentaries written for The Vindicator by YSU faculty and staff members. The views expressed do not necessarily represent those of the university or the newspaper.

For example, we could not have Einstein's relativity theory without having an apparatus of differential geometry and so forth. Another example, Professor G.H. Hardy, an English mathematician and one of the most famous number theorists, was proud that everything he invented in mathematics was so abstract, so beautiful, so pure that it should never be applicable. Well, after his death some of his pure results have been applied in atomic physics.

There is another, more current example. Hungarian-born Johann von Neumann, the father of computers and one of the most brilliant minds of the 20th century, published in the 1920s a very abstract set theory. In 1928 he proved the now-famous "minimax theorem." With his discovery and a much later work by George Danzig, the decision theory was born.

**OR techniques:** The latter became a part of what we call Operation Research, or just OR. In 1944 von Neumann wrote a book with Oskar Morgenstern on applications of his methods to economics (by the way, Morgenstern later became president of IBM). Later applications were found in military sciences. OR techniques were first used by the United States Air Force as early as World War II, in the battle that took place on the Bismarck Sea.

For some time now, OR techniques have been successfully applied in medicine. For example, they are used to make scientific decisions while dealing with multistain illnesses such as AIDS. Some faculty members in my department are collaborating on similar issues with physicians from St. Elizabeth Hospital Medical Center.

Need more applications? Computers using Jan Lukasiwicz's multivalued logic are running the subway system in a few major Japanese cities. Also, most people are not aware that many aspects of cryptography may be treated systematically, by means of some fundamental mathematical concepts and methods.

Or maybe you thought: "We put a man on the moon. Further, there are so many mathematics books in a library with all the formulas. So, mathematics is dead; there is nothing to discover."

**Unanswered questions:** Wrong! There are thousands and thousands of unanswered questions in mathematics — we call them open problems. World-famous Professor Paul Erdos offers his own money for solutions to his problems. Solve one and you can earn \$500.

Here, at Youngstown State University, we have our own Problem Book. There are also prizes for solutions to the problems. You can get an inexpensive champagne, a small red fish for your home aquarium, a handshake, etc. Stop by the mathematics department — we will leave the light on for you.