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577 King Edward, POB/CP 450-A
Ottawa, ON K1N 6N5
Fax/Télec: 613 565 1539

SYNOPSIS

It is known that for a class of 23 students the probability that at least two students have the same birthday is more than 0.5. Suppose that the number of days in the calendar tends to infinity. For a fixed number p with $0 < p < 1$ we give an asymptotic formula and a simple proof, not using Stirling's formula, for the minimum class size to ensure a probability of at least p that two or more students have the same birthday.

The simple and usual method of solving the quadratic polynomial is "completing the square"; however, as anyone who has tried knows, this is woefully inadequate for the cubic polynomial. And, unlike the quadratic, the solution of the cubic is not a part of the standard high-school curriculum, but is still quite accessible to young students. All that is required is some background in basic polynomial algebra, which we will cover. So now, you too can solve a cubic.

This month's "free sample" is:

2532. *Proposed by Ho-joo Lee, student, Kwangwoon University, Kangwon-Do, South Korea.*

Suppose that a, b and c are positive real numbers satisfying $a^2+b^2+c^2=1$. Prove that

$$\frac{1}{a^2}+\frac{1}{b^2}+\frac{1}{c^2} \;\geq\; 3+\frac{2(a^3+b^3+c^3)}{abc}\,.$$