Intriguing problems from combinatorics, algebra and analysis solvable by probability

Jordan Stoyanov*

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Abstract: The goal of this lecture is to show that diverse mathematical problems from the above mentioned areas can be solved quite elegantly by using ideas and techniques from Probability. Sometime these are the only available solutions.

Some of the following topics will be discussed in detail:

- Combinatorial and algebraic identities.
- Buridan Donkey story (BD). Random walk in random environment (JD).
- A problem involving two dice, fair or unfair?
- Toss 15 dice, if your sum = your product, you win 1 million! Ready to play?
- Bernoulli LLN and Weierstrass theorem by Bernstein polynomials.
- Many ways to interpret and solve the equation $X + Y = XY$.
- Values of the Riemann zeta functions via Cauchy distribution.
- Old Uspensky's problem and its far extensions.
- A few exercises, conjectures and unsolved problems.

The material will be addressed to a wide audience: undergraduate and graduate students in mathematical sciences, as well as to professionals.

*Newcastle University