March Madness…The Billion Dollar Prize

Why is Warren Buffett so sure no one will predict the succession of defeats and victories during the NCAA tournament? He has guaranteed the prize, a billion dollars. Are we astounded because someone is fiscally capable of such a guarantee, or because we understand how improbable the feat would be, knowing a lot about the teams, or simply flipping a coin for the data.

The tournament begins with 32 games, each producing a winner and a loser. Two outcomes are possible, indeed one is realized, for each game. The win loss pattern for the 32 games can exist in

$$2^{32}$$

distinct ways. A useful rule of thumb is

$$2^{10} \cong 10^3$$

because $2^{10} \equiv 1024$. This approximation is good to 2.4 % accuracy. thus

$$2^{32} \equiv 2^2 \times 2^{10} \times 2^{10} \times 2^{10}$$

$$\cong 4 \times 10^3 \times 10^3 \times 10^3$$

This is four billion outcomes.

Warren is nuts !?!

All one needs to do is print out each possibility, say one set of wins-losses per page. A machine programmed to handle a thousand prints a minute would require 4 million minutes, or about 8 years, at 525,960 minutes per year.

Maybe he's not so nuts.

We only considered the first round up to now. In the second round there will be a possible

$$2^{16}$$

distinct outcomes. By our rule of thumb, that's

$$2^6 \times 2^{10} = 64,000$$

Thus, the number of possible outcomes during the first and the second rounds is

$$64 \times 10^3 \times 4 \times 10^9 = 256 \times 10^{12}$$

That's 256 trillion. There are additionally, an eight game "sweet sixteen", a four game quarter finals, a two game semifinals and a finals, for a total of 15 more games, with

$$2^{15}$$

possible outcomes. That means the final number of possible outcomes is

$$2^{15} \times 256 \times 10^{12} = 32,000 \times 256 \times 10^{12} = 32 \times 256 \times 10^{15}$$

This is 32 times 256 million billion. 32 times 256 is exactly 8,192. Thus, the final result obtained above, approximately 8 thousand million billions, can be expressed as

$$8 \times 10^{18}$$

outcomes. That's eight quintillion.

     To print a possible distinct outcome for the wins and loses per page for all 63 games, say at a million distinct prints per minute, would take 16 million years, and 16 quadrillion reams of paper.

     I think Warren's money is safe, but not absolutely safe.

Ronald F. Fox
Smyrna, Georgia
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