Human genetics

How many genetically distinct people are there?

$$3^{21\,000} = 10^{21\,000\,\log 3} \approx 10^{10\,020}$$

[Or, if you were asked to estimate this number, say for an oral exam, you could say

$$3^{21\,000} = (3^2)^{10\,500} = 9^{10\,500} \approx 10^{10\,000}. \quad]$$

Population of the earth today? 7×10^9

Number of overturns of human population required to realize all genetically distinct people:

$$\frac{10^{10\,020}}{7 \times 10^9} \approx 10^{10\,010}$$

Amount of time required for an overturn of the human population? About 100 years.

Thus years required to realize all genetically distinct people: $10^{10\,012}$

Age of the universe? 14×10^9 years

Number of universe-ages required to realize all genetically distinct people:

$$\frac{10^{10\,012}}{14 \times 10^9} \approx 10^{10\,002}$$

Moral of the story: A number like 7 billion people is enormous compared to the number of your friends, or to the number of students at Oberlin College, or to the number of downloads for a viral YouTube video. But it's tiny compared to the number of genetically distinct people possible.

> "We are going to die, and that makes us the lucky ones. Most people are never going to die because they are never going to be born. ...We privileged few, who won the lottery of birth against all odds, how dare we whine at our inevitable return to that prior state from which the vast majority have never stirred?"
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> — Richard Dawkins, *Unweaving the Rainbow: Science, Delusion and the Appetite for Wonder* (1998)