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Short Commentary

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Irrational Numbers Do Not Exist

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The Rational Number ρ

Let r and n be integers whose absolute values approach *infinity*, then

$$\lim_{|r|,|n|\to\infty} \frac{r}{n} = \rho \qquad (1)$$

Any rational number that is very near to r/n will converge to ρ

$$\lim_{|r|,|n|\to\infty,\ \to\infty} \left(\frac{r}{n}+\frac{k}{n}\right) = \lim_{|r|,|n|\to\infty} \left(\frac{r}{n}+0\right) = \rho$$

for any small integer k.

Because we are dealing with large integers, it is not necessary to assume that they are relatively prime. What is relevant is the limit of their ratio.

Proof that √2 is rational

Let $\sqrt{2} = \lim_{r,n\to\infty} \frac{r}{n}$, where r and n are very large integers.

Squaring both sides

$$\lim_{r,n\to\infty} \frac{r^2}{n^2} = 2$$

Since

$$\lim_{r\to\infty} r^2 = \lim_{n\to\infty} 2n^2$$

$$\infty = \infty$$

we can not know whether the large integers r and n are both even.

Adding 1 to r and getting the limits below

$$\lim_{r,n\to\infty} \left(\frac{r+1}{n}\right) = \lim_{r,n\to\infty} \left(\frac{r}{n}+\frac{1}{n}\right) = \lim_{r,n\to\infty} \left(\frac{r}{n}+0\right) = \sqrt{2}$$

$$\lim_{r,n\to\infty} \frac{(r+1)^2}{n^2} = \lim_{r,n\to\infty} \frac{(r^2+2r+1)}{n^2} = \lim_{r,n\to\infty} \left(\frac{r^2}{n^2}+\frac{2\sqrt{2}}{n}+\frac{1}{n^2}\right)$$

$$= \lim_{r,n\to\infty} \left(\frac{r^2}{n^2}+0+0\right) = \lim_{r,n\to\infty} \left(\frac{r^2}{n^2}\right) = 2$$

Therefore, √2 is a rational number.

$$\sqrt{2} = \frac{14142135623.......d}{10000000000........0} = 1.4142135623......d$$

where d is the last decimal digit of √2.

Remarks: There are no irrational numbers. The numbers e, π,√3, √5, … are all rational numbers defined by (1).