Perspex Machine IX:
Transreal Analysis

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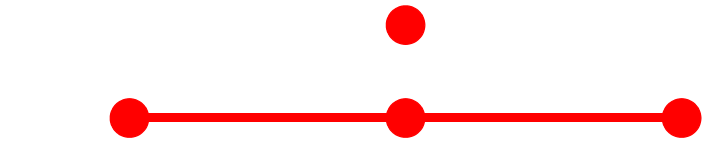
$$\Phi = 0/0$$



$$\frac{de^x}{dx} = e^x$$

$$\ln\Phi = \ln e^{\Phi} = \Phi$$

$$\ln\infty = \ln e^{\infty} = \infty$$

$$\ln 0 = \ln e^{-\infty} = -\infty$$

$$\ln(-x) = \Phi : -x < 0$$

$$\exp(x) = \begin{cases} (\exp(-x))^{-1} : x < 0 \\ \lim_{k \to \infty} 1 + \frac{x}{1!} + \frac{x^2}{2!} + \ldots + \frac{x^k}{k!} : \text{otherwise} \end{cases}$$

$$1^x = \begin{cases} 1 : x \in R \\ \Phi : x \in \{-\infty, \infty, \Phi\} \end{cases}$$

$$\cos^2 x + \sin^2 x = 1^x$$

$$\cosh^2 x - \sinh^2 x = 1^x$$

$\frac{\sin x}{x}$ is everywhere well defined!

$$0^0 = 0^{(1-1)} = 0^1 \times 0^{-1} = \left(\frac{0}{1}\right)^1 \times \left(\frac{0}{1}\right)^{-1} = \frac{0}{1} \times \frac{1}{0} = \frac{0}{0} = \Phi$$

Oral Presentation of Perspex Machine VIII: Axioms of Transreal Arithmetic
Vision Geometry XV, Thursday, 8.20 a.m.