



Math for the people, by the people.

Gauss' digamma theorem

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Theorem (Gauss).

$$\Psi(x+n) = \frac{1}{x} + \frac{1}{x+1} + \cdots + \frac{1}{x+n-1} + \Psi(x), n = 1, 2, 3, \dots$$

$$\Psi\left(\frac{p}{q}\right) = -\gamma - \frac{\pi}{2} \cot \frac{\pi p}{q} - \ln q + \sum_{n=1}^{q-1} \cos \frac{2\pi np}{q} \ln \left(2 \sin \frac{\pi n}{q}\right)$$

where $0 < p < q$.