A Short Reference for Algebraic Properties.

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1 Synopsis:

LET the following theorems, proof, and definitions for this note.

2 Observations:

LET the following observations for a set of theorems and remarks:

Theorem 2.1. *There exist for $p, \mathrm{L}, f(a,qk), a, q, k \in \mathbb{R}$.:*

$$\lim_{p\to \mathrm{L}}(\frac{f(a,qk)}{k} + \Big(\pi^{\frac{1}{12}} - \frac{\zeta(3)}{\pi}\Big))^p,\ f(a,qk), p \neq 0. \tag{1}$$

Solutions of $\lim_{p\to\mathrm{L}}\Big(\frac{f(a,qk)}{k} + \Big(\pi^{\frac{1}{12}} - \frac{\zeta(3)}{\pi}\Big)\Big)^p$, $\mathrm{L} \in \{2k : k \in \mathbb{Z}\}$.

Remark 2.2. There exist an infinite set of solutions in $\mathrm{L} \in \{2k : k \in \mathbb{Z}\}$ in parity.

Remark 2.3. There exist an infinite set of solutions of transcendental property.

Remark 2.4. Per recent exploration of previously stated properties, It may be worth sharing this specific bounded integral:

$$\int_{\frac{1}{2}}^{2} \pi^{\frac{3}{12}} + \frac{\zeta(2)}{\pi} = \frac{1}{4}\Big(6\cdot\pi^{\frac{1}{4}} + \pi\Big).$$

Admits a sequence of solutions in $\mathbb{R}$, of algebraic and transcendence property. Posing the limit of $(\pi^{\frac{3}{12}} + \frac{\zeta(2)}{\pi})$ in $+\infty$, we get:

$$\lim_{x\to 0}\Big(\pi^{\frac{3}{12}} + \frac{\zeta(2)}{\pi}\Big) = \frac{1}{4}\Big(6\cdot\pi^{\frac{1}{4}} + \pi\Big).$$

Which seems to be generalizable under the following term for $n \neq 0$, $n \in \mathbb{N}$. And a non-zero $p \in \mathbb{N}$.:

$$\int_{\frac{1}{p}}^{p} \pi^{\frac{3}{12}} + \frac{\zeta(n)}{\pi}.$$

Remark 2.5. Developping further from Remark 2.4, we establish the inequality consisting of the Riemann zeta function on the left:

$$\zeta\Big(\frac{1}{n}\Big) < \frac{1}{4}\Big(6\cdot\pi^{\frac{1}{4}} + \pi\Big) - \zeta(3)$$

For the following expression $n \geq 2$ defined for the following expression $\forall n \in \mathbb{R}$.

Corollary 2.6. *There exist an indetity of the following for $\forall t, k, x \in \mathbb{R}$.:*

$$\mathcal{M}(x,k) = \int_n^p \mathcal{M}_x(\mathcal{X}_k)\cdot t\,dt,$$
$$\mathcal{M}(x,k)^2 = \int_n^p \mathcal{M}_x(\mathcal{X}_k)\cdot t\,dt^2.$$

And thus we may write the following:

$$\mathcal{M}(x,k)^2 + \mathcal{M}(x,k).$$

Which then could be rewritten as:

$$F(x,k) = \mathcal{M}(x,k)^2 + \mathcal{M}(x,k).$$

Adding the tensors defined as: $\mathcal{T}_3, \mathcal{T}_2 \in \mathbb{R}.$*:*

$$F(x,k) + \mathcal{T}_2 = \mathcal{M}(x,k)^2 + \mathcal{M}(x,k) + \mathcal{T}_3.$$

A more complete definition with $\mathcal{T}_2$ *and* $\mathcal{T}_3$ *would then be:*

$$\mathcal{T}_2 = \mathcal{M}(x,k)^2 + \mathcal{M}(x,k)^1 + \mathcal{T}_3 - F(x,k),\ \forall x, k \in \mathbb{R}.$$

A more rigorous form of the equation above would be:

$$\pm\mathcal{T}_2 = \mathcal{M}(x,k)^2 + \mathcal{M}(x,k)^1 + \mathcal{T}_3 \pm F(x,k),\ \forall x, k \in \mathbb{R}.$$

3 Going Forward:

NOW, we may start working on further notes regarding riemannian and differential geometry, alongside several advanced algebra concepts.

References

[1] Chambadal, L. *Dictionnaire de mathématiques*. FeniXX, 1981.

[2] Fatou, P. Séries trigonométriques et séries de taylor. *Acta mathematica 30*, 1 (1906), 335–400.

[3] Hardy, G. *A Course of Pure Mathematics*. Cambridge Mathematical Library. Cambridge University Press, 2002.

[4] Pinter, C. C. *A book of abstract algebra*. Courier Corporation, 2010.

[5] Titchmarsh, E. C., and Heath-Brown, D. R. *The theory of the Riemann zeta-function*. Oxford university press, 1986.

[6] Weil, A., and Weil, A. *Basic number theory*, vol. 1974. Springer, 1967.