1021-11-5 **H. Vic Dannon*** (`vick@adnc.com`), CA. *Riemann Hypothesis Proof.*

In 1859, Riemann derived the functional equation $\xi(z) = \xi(1-z)$ that defines his $\zeta(z)$ as analytic function in $z \neq 1$.
In $x > 1$, $\zeta(z)$ equals $\sum 1/n^z$.
For $x > 0$, Riemann proved $\xi(z) = \lim_{N\to\infty} \int_{t=0}^{t=\infty} (\sum_{n=1}^{N} e^{-n^2\pi t}) t^{\frac{1}{2}z-1} dt$. But his derivation was misinterpreted as a proof of his functional equation. In that confusion, the formula was lost. We supply a detailed proof of it.
Riemann claimed that all the zeros of $\zeta(z)$ in $0 < x < 1$, are on the line $x = \frac{1}{2}$.
Put $|\xi(z)| \equiv \varphi(z)$, and let $0 < \alpha < \frac{1}{2}$. We use Riemann's formula to show that $\varphi(\frac{1}{2} - \alpha + iy_0)$ is decreasing.
Thus, $\zeta(\frac{1}{2} - \alpha_0 + iy_0) = 0$ implies $0 = \varphi(\frac{1}{2} - \alpha_0 + iy_0) \geq \varphi(\frac{1}{2} - \alpha + iy_0) \geq 0$, for all $0 < \alpha < \alpha_0$, and then $\zeta(z) \equiv 0$.
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