92)

$$z\Gamma(z) = \lim_{n\to\infty} \frac{n!\, n^{z}}{z(z+1)\dots(z+n)} \cdot z =$$

$$= \lim_{n\to\infty} \frac{n!\, n^{z+1}}{(z+1)\dots(z+n+1)} \cdot \frac{z+n+1}{n} =$$

$$= \Gamma(z+1)$$

$$\Gamma(z)\Gamma(1-z) = -z\Gamma(z)\Gamma(-z) =$$

$$= -z\left(ze^{\gamma z}\prod_{k=1}^{\infty}\left(1+\frac{z}{k}\right)e^{-\frac{z}{k}}\right)^{-1}\left(-ze^{-\gamma z}\prod_{k=1}^{\infty}\left(1-\frac{z}{k}\right)e^{\frac{z}{k}}\right)^{-1}$$

$$= \left(z\prod_{k=1}^{\infty}\left(1-\frac{z^2}{k^2}\right)\right)^{-1} = \frac{\pi}{\sin(\pi z)}$$

$$\Gamma\left(\tfrac{1}{2}\right)\Gamma\left(\tfrac{1}{2}\right) = \frac{\pi}{\sin\frac{\pi}{2}} = \pi$$

$$\Rightarrow \Gamma\left(\tfrac{1}{2}\right) = \sqrt{\pi}$$

$\gamma = 0,5772\dots$ nie wiadomo, czy $\gamma \in \mathbb{Q}$