$\Gamma(p)\,\Gamma(q) = \Gamma(p+q)\,B(p,q)$

$B(p,q) = \int_0^1 t^{p-1}(1-t)^{q-1}\,dt$

$\Gamma(p) = \int_0^\infty t^{p-1} e^{-t}\,dt$

$$\Gamma(p)\,\Gamma(q) = \int_0^\infty t^{p-1}e^{-t}\,dt \cdot \int_0^\infty t^{q-1}e^{-t}\,dt = \int_0^\infty\int_0^\infty t^{p-1}e^{-t}\,u^{q-1}e^{-u}\,du\,dt =$$

$$= \int_0^\infty\int_0^\infty t^{p-1}\,u^{q-1}\,e^{-(t+u)}\,du\,dt$$

$u = ty$

$t = x(1-y)$

$t + u = xy + x - xy = x \Rightarrow 0 < x < \infty$

$0 < xy < \infty$

x dodatni $\Rightarrow y$ dodatni

$0 < x(1-y) < \infty$

x dodatni $\Rightarrow (1-y)$ dodatni zato $y < 1$

y dodatni $0 < y < 1$

$$J = \begin{vmatrix} 1-y & -x \\ y & x \end{vmatrix} = x \Rightarrow \int_0^\infty\int_0^\infty t^{p-1}\,u^{q-1}\,e^{-(t+u)}\,du\,dt =$$

$$= \int_0^\infty\int_0^1 (x(1-y))^{p-1}\,(xy)^{q-1}\,x\,e^{-x}\,dy\,dx = \int_0^\infty\int_0^1 x^{p-1+q-1+1}\,e^{-x}\,y^{q-1}(1-y)^{p-1}\,dy\,dx$$

$$= \int_0^\infty x^{p+q-1}e^{-x}\,dx \cdot \int_0^1 y^{q-1}(1-y)^{p-1}\,dy = \Gamma(p+q)\int_0^1 s^{p-1}(s-1)^{q-1}\,ds$$

$$= \Gamma(p+q)\,B(p,q)$$

$s = 1-y \quad 1 \to 0$

$ds = -dy \quad 0 \to 1$