

$$1 > \frac{\Gamma(x+1)\Gamma(\textcolor{blue}{x/3+2})}{(x+1)^2 \left(\frac{x+1}{3e^4}\right)^{x/3}} > \frac{2\pi}{3\sqrt{3}e^{4/3}} \approx \textcolor{blue}{0.318741}$$