$$A=\lim_{x\to 1}(1-x)^{\cos\frac{\pi x}{2}}$$

полагам:

$$t=\cos\frac{\pi x}{2}$$

при

x=1 $\Rightarrow$ t=0

$$x=\frac{2}{\pi}\arccos t$$

$$A=\lim_{t\to 0}\left(1-\frac{2}{\pi}\arccos t\right)^{t}$$

$$\ln A=\ln\ \lim_{t\to 0}\left(1-\frac{2}{\pi}\arccos t\right)^{t}$$

$$\ln A=\lim_{t\to 0}\ \ln\left(1-\frac{2}{\pi}\arccos t\right)^{t}$$

$$\ln A=\lim_{t\to 0}\ \mathrm{t}\ln\left(1-\frac{2}{\pi}\arccos t\right)$$

$$\ln A=\lim_{t\to 0}\ \frac{\ln\left(1-\frac{2}{\pi}\arccos t\right)}{\frac{1}{t}}$$

$$\ln A=\lim_{t\to 0}\ \frac{\frac{1}{\left(1-\frac{2}{\pi}\arccos t\right)}.\left(-\frac{2}{\pi}.\frac{-1}{\sqrt{1-t^2}}\right)}{-\frac{1}{t^2}}=\lim_{t\to 0}-\frac{2}{\pi\sqrt{1-t^2}}\frac{t^2}{\left(1-\frac{2}{\pi}\arccos t\right)}$$

$$\ln A=\lim_{t\to 0}-\frac{2}{\pi\sqrt{1-t^2}}\lim_{t\to 0}\frac{t^2}{\left(1-\frac{2}{\pi}\arccos t\right)}=-\frac{2}{\pi}.\lim_{t\to 0}\frac{2t}{-\frac{2}{\pi\sqrt{1-t^2}}}=-\frac{2}{\pi}.\lim_{t\to 0}-\pi t\sqrt{1-t^2}$$

$$\ln A=2.\lim_{t\to 0}t\sqrt{1-t^2}=2.0.\sqrt{1}=0$$

$$\ln A=0$$

$$A=e^0=1$$

$$A=\lim_{x\to 1}(1-x)^{\cos\frac{\pi x}{2}}=1$$