$$\lim_{x\to -1}\frac{x^3-3x-2}{x^3+2x^2-x-2}=\lim_{x\to -1}\frac{(x^2-x-2)(x+1)}{x(x+1)(x-1)+2(x+1)(x-1)}=$$

$$=\lim_{x\to -1}\frac{(x^2-x-2)}{(x+2)(x-1)}=0$$

$$\lim_{x\to\infty}\left(\sqrt[3]{(x+1)^2}-\sqrt[3]{(x-1)^2}\right)=$$

$$=\lim_{x\to\infty}\frac{\left(\sqrt[3]{(x+1)^2}-\sqrt[3]{(x-1)^2}\right)\left(\sqrt[3]{(x+1)^4}+\sqrt[3]{(x+1)^2(x-1)^2}+\sqrt[3]{(x-1)^4}\right)}{\left(\sqrt[3]{(x+1)^4}+\sqrt[3]{(x+1)^2(x-1)^2}+\sqrt[3]{(x-1)^4}\right)}=$$

$$=\lim_{x\to\infty}\frac{(x+1)^2-(x-1)^2}{\left(\sqrt[3]{(x+1)^4}+\sqrt[3]{(x+1)^2(x-1)^2}+\sqrt[3]{(x-1)^4}\right)}=$$

$$=\lim_{x\to\infty}\frac{4x}{\left(\sqrt[3]{(x+1)^4}+\sqrt[3]{(x+1)^2(x-1)^2}+\sqrt[3]{(x-1)^4}\right)}=$$

$$=\lim_{x\to\infty}\frac{4}{\left(\sqrt[3]{\frac{(x+1)^4}{x^3}}+\sqrt[3]{\frac{(x+1)^2(x-1)^2}{x^3}}+\sqrt[3]{\frac{(x-1)^4}{x^3}}\right)}=0$$

$$\lim_{x\to 2}\frac{\sin 7\pi x}{\operatorname{tg} 8\pi x}=$$

Делаем замену $y=x-2$, тогда $x=y+2$

$$=\lim_{y\to 0}\frac{\sin(7\pi y+2\pi)}{\operatorname{tg}(8\pi y+2\pi)}=\lim_{y\to 0}\frac{\sin 7\pi y}{\operatorname{tg} 8\pi y}=\lim_{y\to 0}\frac{7\pi y}{8\pi y}=\frac{7}{8}$$

$$\lim_{x\to 0}\sqrt[x^2]{2-\cos x}=\lim_{x\to 0}(1+1-cosx)^{\frac{1}{x^2}}=e^{\lim_{x\to 0}\frac{1-cosx}{x^2}}=$$

$$=e^{\lim_{x\to 0}\frac{1-cos\left(2\frac{x}{2}\right)}{x^2}}=e^{\lim_{x\to 0}\frac{1-\left(1-2\sin^2\frac{x}{2}\right)}{x^2}}=$$

$$=e^{\lim_{x\to 0}\frac{2\sin^2\frac{x}{2}}{2\cdot 2\cdot\left(\frac{x}{2}\right)^2}}=e^{\frac{1}{2}}$$