D') $7 \neq 0$ $x \to 0$

$$\frac{3x^2-5x^3+o(x^4)}{x^3+4x^4+o(x^3)} = \frac{-5x^3+o(x^3)}{x^3+o(x^3)} = \underline{-5}$$

8.6. $$\lim_{x\to 1} \frac{\sqrt[3]{7+x^3}-\sqrt{3+x^2}}{x-1} \; (=)$$

$$\begin{cases} x-1=t \\ x=t+1 \\ t\to 0 \end{cases}$$

$$(=) \lim_{t\to 0} \frac{\sqrt[3]{7+(t+1)^3}-\sqrt{3+(t+1)^2}}{t} = \frac{\sqrt[3]{8+t^3+3t^2+3t}-\sqrt{3+t^2+2t+1}}{t} =$$

$$= \frac{2\left(1+\frac{3}{8}t+o(t)\right)^{\frac{1}{3}}-2\left(1+\frac{t}{2}+o(t)\right)^{\frac{1}{2}}}{t} = \frac{2\left(1+\frac{1}{3}\cdot\frac{3}{8}t+o(t)\right)-2\left(1+\frac{1}{2}\cdot\frac{1}{2}t+o(t)\right)}{t}$$

$$= \frac{\frac{1}{4}t-\frac{1}{2}t+o(t)}{t} = \frac{1}{4}$$

8.12 $$\lim_{x\to\pi}\left(\frac{1+\operatorname{tg}x}{1+\sin x}\right)^{\frac{1}{\sin^3 x}} = e^{\lim\limits_{x\to\pi}\frac{1}{\sin^3 x}\left(\frac{1+\operatorname{tg}x}{1+\sin x}-1\right)} =$$

$$= e^{\lim\limits_{x\to\pi}\left(\frac{1}{\sin^3 x}\cdot\frac{1+\operatorname{tg}x-1-\sin x}{1+\sin x}\right)} (=)$$

$x-\pi=t$
$x=(t+\pi)$
$t\to 0$

$$(=) e^{\lim\limits_{t\to 0}\frac{t+o(t)+t}{(-t^3+o(t^3))(1-t+o(t))}} = e^{\lim\frac{2t+o(t)}{-t^3+t^4+o(t^4)}}.$$

$$= e^{\lim\limits_{t\to 0}\frac{2t+o(t)}{o(t)}} = e^0 = \underline{1}$$

8.26 $\lim\limits_{x\to 0} \frac{th x}{x} = \lim\limits_{x\to 0} \frac{e^x-e^{-x}}{x(e^x+e^{-x})} = \lim\limits_{x\to 0} \frac{1+x+o(x)-1+x+o(x)}{x(1+x+1-x+o(x))} =$

$= \frac{2x+o(x)}{2x+o(x)} = 1$

8.32 $\lim\limits_{x\to 0} \frac{\sqrt[3]{27+x} - \sqrt[4]{16-x} - e^x}{\ln(1+e^x-\cos x)} = \lim\limits_{x\to 0} \frac{3(1+\frac{x}{27})^{\frac{1}{3}} - 2(1-\frac{x}{16})^{\frac{1}{4}} - e^x}{\ln(1+1+x+o(x)-1+\frac{x^2}{2}+o(x^2))} =$

$= \lim\limits_{x\to 0} \frac{3(1+\frac{x}{3}\cdot\frac{x}{27}+o(x)) - 2(1-\frac{x}{64}+o(x)) - 1 - x - o(x)}{\underbrace{\ln(1+x+o(x))}_{\to 1}} =$

$= \lim\limits_{x\to 0} (3+\frac{x}{27}+o(x) - 2 + \frac{x}{32} + o(x) - 1 - x + o(x)) =$

$= \lim\limits_{x\to 0} (\frac{27x+32x}{864} - x + o(x)) = \lim (\frac{59x-864x}{864} + o(x)) =$

$= \lim\limits_{x\to 0} (-\frac{805x}{864} + o(x)) = -\frac{805}{864}$

8.46 $f(x) = \cos x - 1$, $g(x) = 1 - ch x$ $\quad \frac{f(x)}{g(x)}$

$\lim\limits_{x\to 0} = \frac{\cos x - 1}{ch x - 1} = \lim\limits_{x\to 0} \frac{1-\frac{x^2}{2}+o(x^2) - 1}{\frac{x^2}{2}+o(x^2)} =$

$= \frac{-\frac{x^2}{2}+\cancel{o(x^2)}}{\frac{x^2}{2}+\cancel{o(x^2)}} = -1 \Rightarrow f \sim g$

8.57 $f(x) = x^x \qquad g(x) = 1 \qquad \frac{f(x)}{g(x)}$

$\lim\limits_{x\to 0} x^x = \lim\limits_{x\to 0} e^{x\cdot\ln x} = \lim\limits_{x\to 0} e^0 = 1 \quad f \sim g$