1) $$\lim_{x\to-\infty} \frac{7x-1}{\sqrt{9x^2+2}-\sqrt{x^2+4}} = \lim_{x\to-\infty} \frac{x\left(7-1/x\right)}{|x|\left(\sqrt{9+\frac{2}{x^2}}-\sqrt{1+\frac{4}{x^2}}\right)} =$$

$$= \lim_{x\to-\infty} \frac{x\left(7-1/x\right)}{-x\left(\sqrt{9+\frac{2}{x^2}}-\sqrt{1+\frac{4}{x^2}}\right)} = (-1)\cdot\frac{7}{2} = -\frac{7}{2}$$

$$\lim_{x\to0} \frac{\operatorname{arctg} 7x^2+\sin 3x^3}{\cos x - e^{4x^2}} = \lim_{x\to0} \left(\frac{\operatorname{arctg} 7x^2}{7x^2}\cdot 7x^2+\frac{\sin 3x^3}{3x^3}\cdot 3x^3\right)\cdot$$

$$\cdot\frac{1}{x^2\cdot\frac{\cos x-1}{x^2}+\frac{1-e^{4x^2}}{4x^2}\cdot 4x^2} = \lim_{x\to0} \frac{x^2\left[\frac{\operatorname{arctg} 7x^2}{7x^2}\cdot 7+\frac{\sin 3x^3}{3x^3}\cdot 3x\right]}{-x^2\left(\frac{1-\cos x}{x^2}+4\cdot\frac{e^{4x^2}-1}{4x^2}\right)} =$$

$$= \frac{7}{-1\left(\frac{1}{2}+4\right)} = -\frac{14}{9}$$

2) $$f(x) = \frac{\arcsin 5x^2}{e^{-\sin x}}$$

$-1\leq 5x^2\leq 1 \iff 5x^2-1\leq 0$ (perché $-1\leq 5x^2$ è sempre soddisfatta) $\iff$ $-\frac{1}{\sqrt5}\leq x\leq \frac{1}{\sqrt5}$ (le radici dell'eq. associate $5x^2-1=0$ sono $x_{1/2}=\pm\frac{1}{\sqrt5}$)

$$\Rightarrow D_f = \left[-\frac{1}{\sqrt5}, \frac{1}{\sqrt5}\right]$$

$$g(x) = \sqrt{5\cdot 2^x - 4\cdot 3^x}$$

$$5\cdot 2^x - 4\cdot 3^x \geq 0 \iff \left(\frac{2}{3}\right)^x \geq \frac{4}{5} \iff$$

$$x \leq \log_{\frac{2}{3}}\left(\frac{4}{5}\right)$$

$$D_g = \left]-\infty, \log_{\frac{2}{3}}\left(\frac{4}{5}\right)\right)$$