1. $$\lim_{x \to \infty} \frac{(23-2x^2)(3x^2+17)^2}{4x^6+x-1} = \frac{-18x^6+3x^4+1768x^2+6647}{4x^6+x-1}$$

$$= -\frac{18}{4} = -\frac{9}{2}$$

2. $$\lim_{x \to \infty} \frac{(97-2x)^3}{2x(3x^2+15)+8x} = \frac{-8x^3+1164x^2-56454x+912673}{6x^3+38x} =$$

$$= -\frac{8}{6} = -\frac{4}{3}$$

3. $$\lim_{x \to \infty} \frac{2x^3+13x(x+18)}{(27-x)(2x+19)^2} = \frac{2x^3+13x^2+234x}{-4x^3+32x^2+1691x+9747} =$$

$$= -\frac{2}{4} = -\frac{1}{2}$$

4. $$\lim_{x \to 6} \frac{x^2-36}{x^2-x-30} = \frac{(x-6)(x+6)}{(x-6)(x+5)} = \frac{x+6}{x+5} =$$

$$= \frac{12}{11}$$

5. $$\lim_{x \to 7} \frac{x^2-49}{x^2-13x+42} = \frac{(x-7)(x+7)}{(x-7)(x-6)} = \frac{x+7}{x-6} = 14$$

$$7.\ \lim_{x\to 0} \frac{3x\, tg(4x)}{1-\cos(4x)} = \frac{3x\, tg(4x)}{2\cdot \sin^2\left(\frac{4x}{2}\right)} =$$

$$= \frac{3}{2} \lim_{x\to 0} \frac{x\cdot \sin(4x)}{\sin(2x)\cdot \sin(2x)} =$$

$$= \frac{3}{2} \lim_{x\to 0} \left( \underset{\downarrow\atop 1}{\frac{\sin(4x)}{4x}} \cdot \underset{\downarrow\atop 1}{\frac{2x}{\sin(2x)}} \cdot \underset{\downarrow\atop 1}{\frac{x}{\sin(2x)}\cdot\frac{4}{2}} \right) =$$

$$= \frac{3}{2}$$

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$$8.\ \lim_{x\to 0} \frac{\sqrt{2}\, x^2 \sin(4x)}{(1-\cos(2x))^{3/2}} = \frac{\sqrt{2}\, x^2 \sin(4x)}{(2\sin^2(x))^{3/2}} =$$

$$= \frac{x\cdot x\cdot \sqrt{2}\, \sin(4x)}{2\cdot\sqrt{2}\cdot \sin(x)\cdot \sin(x)\cdot \sin(x)} = \frac{1}{2}\lim_{x\to 0}\left(\frac{x}{\sin x}\cdot\frac{x}{\sin x}\cdot\frac{\sin(4x)}{\sin x}\right)$$

$$= \frac{1}{2}\lim_{x\to 0}\left( \underset{\downarrow\atop 1}{\frac{x}{\sin x}} \cdot \underset{\downarrow\atop 1}{\frac{x}{\sin x}} \cdot \underset{\downarrow\atop 1}{\frac{\sin 4x}{4x}} \cdot \underset{\downarrow\atop 1}{\frac{x}{\sin x}} \cdot \frac{4}{1} \right) = \frac{4}{2} = 2$$

$$9.\ \lim_{x\to\infty}\left(\frac{4x}{4x+3}\right)^{\frac{5x^2}{7x-1}} = \left(\frac{(4x+3)-3}{4x+3}\right)^{\frac{5x^2}{7x-1}} =$$

$$= \left(1-\frac{3}{4x+3}\right)^{\frac{5x^2}{7x-1}} = e^{\lim\limits_{x\to\infty}\left(\frac{-3}{4x+3}\right)\cdot\left(\frac{5x^2}{7x-1}\right)} =$$

$$= e^{\lim\limits_{x\to\infty}\frac{-15x^2}{28x^2+17x-3}} = e^{\frac{-15}{28}} = \frac{1}{e^{\frac{15}{28}}}$$

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$$11.\ \lim_{x\to 0}\frac{5^x-1}{x} = \frac{e^{x\ln 5}-1}{x} = \ln 5$$