L'Hopital's Rule

Use L'Hopital's Rule to find the following limits.

1. $\lim_{x\to 2} \frac{x-2}{x^2-4} = \lim_{x\to 2} \frac{1}{2x} = \boxed{\frac{1}{4}}$

2. $\lim_{x\to 0} \frac{\sin 5x}{x} = \lim_{x\to 0} \frac{5\cos 5x}{1} = \boxed{5}$

3. $\lim_{x\to \infty} \frac{Ln^2 x}{x} = \lim_{x\to \infty} \frac{2Lnx(\frac{1}{x})}{1} = \lim_{x\to \infty} \frac{2\ln x}{x} =$
$\lim_{x\to \infty} \frac{2(\frac{1}{x})}{1} = \lim_{x\to \infty} \frac{2}{x} = \boxed{0}$

4. $\lim_{x\to 1} \frac{x^3-1}{4x^3-x-3} = \lim_{x\to 1} \frac{3x^2}{12x^2-1} = \boxed{\frac{3}{11}}$

5. $\lim_{x\to -2} \frac{x^3+5x^2+x-10}{x^2+x-2} = \lim_{x\to -2} \frac{3x^2+10x+1}{2x+1} = \boxed{\frac{7}{3}}$

6. $\lim_{x\to 0} \frac{\sin 3x}{\sin 4x} = \lim_{x\to 0} \frac{3\cos 3x}{4\cos 4x} = \boxed{\frac{3}{4}}$

7. $\lim_{x\to 0} \frac{\cos(2x)-1}{x} = \lim_{x\to 0} \frac{-2\sin(2x)}{1} = \boxed{0}$

8. $\lim_{x\to 4} \frac{\sqrt{x+5}-3}{x-4} = \lim_{x\to 4} \frac{(\frac{1}{2})(x+5)^{-\frac{1}{2}}}{1}$
$= \lim_{x\to 4} \frac{1}{2\sqrt{x+5)}} = \boxed{\frac{1}{6}}$

9. $\lim_{x\to \infty} \frac{x^2}{e^{4x}} = \lim_{x\to \infty} \frac{2x}{4e^{4x}} = \lim_{x\to \infty} \frac{2}{16e^{4x}} = \boxed{0}$

10. $\lim_{x\to \infty} (x^2+5x-3)e^{-2x} = \lim_{x\to \infty} \frac{x^2+5x-3}{e^{2x}}$
$= \lim_{x\to \infty} \frac{2x+5}{2e^{2x}} = \lim_{x\to \infty} \frac{2}{4e^{2x}} = \boxed{0}$