1) i) $\lim\limits_{h\to0}\dfrac{(x+h)^2-x^2}{h}=\lim\limits_{h\to0}\dfrac{x^2+2hx+h^2-x^2}{h}=\lim\limits_{h\to0}\dfrac{2hx+h^2}{h}=\lim\limits_{h\to0}\dfrac{h(2x+h)}{h}=$

$=\lim\limits_{h\to0}(2x+h)=2x$

ii) $\lim\limits_{x\to0}\dfrac{(x+h)^2-x^2}{h}=\lim\limits_{x\to0}\dfrac{x^2+2hx+h^2-x^2}{h}=\lim\limits_{x\to0}\dfrac{2hx+h^2}{h}=\lim\limits_{x\to0}\dfrac{h(2x+h)}{h}=$

$=\lim\limits_{x\to0}(2x+h)=h$

iii) $\lim\limits_{x\to0}\dfrac{\frac{1}{2+x}-\frac{1}{2}}{x}=\lim\limits_{x\to0}\dfrac{\frac{2-(2+x)}{2(2+x)}}{x}=\lim\limits_{x\to0}\dfrac{\frac{2-2-x}{4+2x}}{x}=\lim\limits_{x\to0}\dfrac{-x}{x(4+2x)}=\lim\limits_{x\to0}\dfrac{-1}{4+2x}=-\dfrac{1}{4}$

iv) $\lim\limits_{x\to0}\dfrac{(2+x)^3-8}{x}=\lim\limits_{x\to0}\dfrac{x^3+6x^2+12x+8-8}{x}=\lim\limits_{x\to0}\dfrac{x^3+6x^2+12x}{x}=\lim\limits_{x\to0}\dfrac{x(x^2+6x+12)}{x}=$

$=\lim\limits_{x\to0}(x^2+6x+12)=12$

2) i) $\qquad\qquad\lim\limits_{\Delta x\to0}\dfrac{f(x+\Delta x)-f(x)}{\Delta x};\ f(x)=\dfrac{4}{x}$

$\lim\limits_{\Delta x\to0}\dfrac{\dfrac{4}{x+\Delta x}-\dfrac{4}{x}}{\Delta x}=\lim\limits_{\Delta x\to0}\dfrac{\dfrac{4x-4(x+\Delta x)}{x(x+\Delta x)}}{\Delta x}=\lim\limits_{\Delta x\to0}\dfrac{4x-4x-4\Delta x}{\Delta x*x(x+\Delta x)}=$

$=\lim\limits_{\Delta x\to0}\dfrac{-4\Delta x}{\Delta x*x(x+\Delta x)}=\lim\limits_{\Delta x\to0}\dfrac{-4}{x^2+x*\Delta x}=-\dfrac{4}{x^2}$

ii) $\qquad\qquad\lim\limits_{\Delta x\to0}\dfrac{f(x+\Delta x)-f(x)}{\Delta x};\ f(x)=x^2-4x$

$\lim\limits_{\Delta x\to0}\dfrac{(x+\Delta x)^2-x^2}{\Delta x}-4\lim\limits_{\Delta x\to0}\dfrac{x+\Delta x-x}{\Delta x}=\lim\limits_{\Delta x\to0}\dfrac{x^2+2x*\Delta x+\Delta x^2-x^2}{\Delta x}-$

$-4\lim\limits_{\Delta x\to0}\dfrac{\Delta x}{\Delta x}=\lim\limits_{\Delta x\to0}\dfrac{2x*\Delta x+\Delta x^2}{\Delta x}-4=\lim\limits_{\Delta x\to0}\dfrac{\Delta x(2x+\Delta x)}{\Delta x}-4=$

$=\lim\limits_{\Delta x\to0}(2x+\Delta x)-4=2x-4=2(x-2)$