c) $\lim\limits_{x\to 1} \dfrac{\frac{1}{x+2}-\frac{1}{3}}{x-1} = \lim\limits_{x\to 1} \dfrac{3(x+2)\left(\frac{1}{x+2}-\frac{1}{3}\right)}{3(x+2)(x-1)} = \lim\limits_{x\to 1} \dfrac{3(x+2)\cdot\frac{1}{(x+2)} - \frac{3(x+2)}{3}}{3(x+2)\cdot(x-1)}$

$= \lim\limits_{x\to 1} \dfrac{3-(x+2)}{3.(x+2)(x-1)} = \lim\limits_{x\to 1} \dfrac{-(x-1)}{3(x+2)(x-1)} = \lim\limits_{x\to 1} \dfrac{-1}{3(x+2)}$

$= -1/9$ //

d) $\lim\limits_{x\to 0} \dfrac{\sin 3x}{4x} = \lim\limits_{x\to 0} \dfrac{\frac{\sin 3x}{3x}.3x}{4x} = \left[\lim\limits_{u\to 0} \dfrac{\sin u}{u} = 1\right]$

$= \lim\limits_{x\to 0} \dfrac{1.3x}{4x} = \dfrac{3}{4}$ //

4) a) $f'(x) = 2x\cos 5x + x^2(-\sin 5x).5 = 2x.\cos 5x - 5x^2.\sin 5x$

b) $f'(x) = \dfrac{3\cos 3x(x^2+1) - \sin 3x(2x)}{(x^2+1)^2}$

c) $f'(x) = 4.\left(-\frac{1}{2}\right)(2x^2-2)^{(-3/2)}.4x = \dfrac{-8x}{(2x^2-2)^{3/2}}$

d) $f'(x) = \dfrac{1}{\cos^2(e^{-x})}\cdot(-e^{-x})$

5) $f(x) = |2x+4|$

$|u| = \begin{cases} -u, & u<0 \\ u, & u>0 \end{cases} \Rightarrow |2h| = \begin{cases} -2h, & 2h<0 \\ 2h, & 2h>0 \end{cases}$

$\lim\limits_{h\to 0^-} \dfrac{f(-2+h)-f(-2)}{h} = \lim\limits_{h\to 0^-} \dfrac{|2(-2+h)+4| - |2.(-2)+4|}{h}$

$= \lim\limits_{h\to 0^-} \dfrac{|-4+2h+4| - |-4+4|}{h} = \lim\limits_{h\to 0^-} \dfrac{|2h|}{h} = \dfrac{-2h}{h} = -2$

Diğer taraftan

$\lim\limits_{h\to 0^+} \dfrac{f(-2+h)-f(-2)}{h} = \lim\limits_{h\to 0^+} \dfrac{|2h|}{h} = \dfrac{2h}{h} = 2$

$\lim\limits_{h\to 0^-} \dfrac{f(-2+h)-f(-2)}{h} \neq \lim\limits_{h\to 0^+} \dfrac{f(-2+h)-f(-2)}{h}$

Bu yüzden $f'(-2)$ de $f(x)$ fonk. türevi yoktur.