Assignment 1

(1) $f(x) = \frac{e^{2x-1}}{x}$, $a = -0{,}5$

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

$$\cancel{f''(x) = \frac{2x^2 - 2x(2x-1)}{x^4}} -$$

$$f''(x) = 2\left(\frac{(2x-1)e^{2x-1}}{x^2}\right) - \frac{2e^{2x-1} \cdot x^2 - 2xe^{2x-1}}{x^4}$$

$$f(-0{,}5) = \frac{e^{-2}}{-0{,}5} = -2e^{-2}$$

$$f'(-0{,}5) = \frac{-2e^{-2}}{-0{,}25} = 8e^{-2}$$

$$f''(-0{,}5) = 16e^{-2} - \frac{\overbrace{0{,}5e^{-2} + e^{-2}}^{1,5}}{-(0{,}5)^4} = 16e^{-2} - 24e^{-2} = -8e^{-2}$$

$$f(x) = f(-0{,}5) + f'(-0{,}5)(x+0{,}5) + \frac{f''(-0{,}5)(x+0{,}5)^2}{2!} =$$

$$= -2e^{-2} + 8e^{-2}(x+0{,}5) - 4e^{-2}(x+0{,}5)^2$$

$$\boxed{-2e^{-2} ; 8e^{-2}(x+0{,}5) ; -4e^{-2}(x+0{,}5)^2}$$

↳ Answer

(2) $f(x)=\sin 2x$, $a=0,5\pi$

$f'(x)=2\cos 2x$ $\qquad f(0,5\pi)=0$

$f''(x)=-4\sin 2x$ $\qquad f'(0,5\pi)=-2$

$f'''(x)=-8\cos 2x$ $\qquad f''(0,5\pi)=0$

$f^4(x)=-16\sin 2x$ $\qquad f'''(0,5\pi)=8$

$f^5(x)=32\cos 2x$ $\qquad f^4(0,5\pi)=0$

$f^5(0,5\pi)=-32$

$$f(x)=f(0,5\pi)\cancel{(x-0,5\pi)}+f'(0,5\pi)(x-0,5\pi)+$$

$$+\frac{f''(0,5\pi)(x-0,5\pi)^2}{2!}+\frac{f'''(0,5\pi)(x-0,5\pi)^3}{3!}+$$

$$+\frac{f''(0,5\pi)(x-0,5\pi)^4}{4!}+\frac{f^5(0,5\pi)(x-0,5\pi)^5}{5!}$$

$$\to f(x)=0\cancel{+}-2(x-0,5\pi)+0+\frac{8(x-0,5\pi)^3}{6}$$

$$+0-\frac{32(x-0,5\pi)^5}{120}$$

$$\boxed{-2(x-0,5\pi);\ \frac{8(x-0,5\pi)^3}{6};\ -\frac{32(x-0,5\pi)^5}{120}}$$

$\to$ Answer