Rezolvare

1. a. Din $f_1(x) = f_0{}'(x) \Rightarrow f_1(x) = -e^{-x}$

b. $\lim\limits_{x\to\infty} f_0(x) = \lim\limits_{x\to\infty}\left(e^{-x} - 1\right) = -1 \Rightarrow y = -1$ ecuația asimptotei orizontale către $+\infty$.

c. $f_2(x) = f_1{}'(x) = e^{-x}$. Atunci $\lim\limits_{x\to\infty} \dfrac{e^{-x} + x - 1}{x^2} = \lim\limits_{x\to\infty} \dfrac{-e^{-x} + 1}{2x} = \lim\limits_{x\to\infty} \dfrac{e^{-x}}{2} = \dfrac{1}{2}$.

2.a. $\int\limits_0^1 \dfrac{f(x)}{\sqrt{x^2+1}}dx = \int\limits_0^1 e^x dx = e - 1$.

b. $g(x) = x\sqrt{x^2+1} \ge 0,\ \forall x \in [0;1] \Rightarrow \text{Aria}\left(\Gamma_g\right) = \dfrac{2\sqrt{2}-1}{3}$.

c. $\int\limits_{-1}^1 \sqrt{x^2+1} \cdot f(x)dx = \int\limits_{-1}^1 e^x\left(x^2+1\right)dx = e^x\left(x^2 - 2x + 3\right)\Big|_{-1}^{1} = 2e - \dfrac{6}{e}$.