Soluție

a) $f'(x) = 3^x \ln 3, \forall x \in \mathbb{R}$

b) $\lim\limits_{x \to -\infty} f(x) = 2 \Rightarrow y = 2$ asimptotă orizontală spre $-\infty$

c) $y - f(0) = f'(0)(x - 0)$

$y - 3 = x \ln 3 \Rightarrow y - x \ln 3 - 3 = 0$

d) $\frac{1}{2}\left[\left(f'(x)\right)^2 + f'(x) + 1\right] - \frac{1}{2}\left[\left(f'(x)\right)^2 - f'(x) + 1\right] =$

$= \frac{1}{2}\left(f'(x)\right)^2 + \frac{1}{2} f'(x) + \frac{1}{2} - \frac{1}{2}\left(f'(x)\right)^2 + \frac{1}{2} f'(x) - \frac{1}{2} = f'(x), \forall x \in \mathbb{R}$

e) $\lim\limits_{x \to -1} \frac{x^2 + 7x + 6}{x^2 - 10x - 11} = \lim\limits_{x \to -1} \frac{(x+6)(x+1)}{(x+1)(x-11)} = \lim\limits_{x \to -1} \frac{(x+6)}{(x-11)} = -\frac{5}{12}$

f) $l_s(-2) = \lim\limits_{x \nearrow -2} \left(x^2 + \alpha\right) = 4 + \alpha$

$l_d(-2) = \lim\limits_{x \searrow -2} (\alpha x - 3) = -2\alpha - 3$

$g(-2) = -2\alpha - 3$

g este continuă în $x = -2 \Rightarrow l_s(-2) = l_d(-2) = g(-2) \Rightarrow 4 + \alpha = -2\alpha - 3 \Rightarrow \alpha = -\frac{7}{3}$