a) $f(x) = \frac{\ln(2x+3)}{\ln(2)}$

$2x+3>0 \Leftrightarrow x > -3/2$

$\Rightarrow ED_f = \left]-3/2 ; +\infty\right[$

$f'(x) = \left(\frac{\ln(2x+3)}{\ln(2)}\right)' = \frac{(\ln(2x+3))' \cdot \ln(2) - \ln(2x+3)\cdot 0}{(\ln(2))^2}$

$= \frac{\frac{(2x+3)'}{2x+3} \cdot \cancel{\ln(2)}}{\ln(2)\cdot \cancel{\ln(2)}} = \frac{2}{2x+3}$

b) $f(x) = \frac{\ln(x^2-2x+1)}{\ln(3)}$

$x^2-2x+1>0 \Leftrightarrow (x-1)^2>0 \Leftrightarrow x \neq 1$

$\Rightarrow ED_f = \mathbb{R} - \{1\}$

$$f'(x) = \left(\frac{\ln(x^2-2x+1)}{\ln(3)} \right)'$$

$$= \frac{\left(\ln(x^2-2x+1)\right)' \cdot \ln(3) - \ln(x^2-2x+1) \overbrace{\left(\ln(3)\right)'}^{0}}{\left(\ln(3)\right)^2}$$

$$= \frac{\frac{(x^2-2x+1)'}{x^2-2x+1} \cdot \cancel{\ln(3)}}{\ln(3) \cdot \cancel{\ln(3)}}$$

$$= \frac{2x-2}{x^2-2x+1} \cdot \frac{1}{\ln(3)} = \frac{2\cancel{(x-1)}}{(x-1)^{\cancel{2}}} \cdot \frac{1}{\ln(3)}$$

$$= \frac{2}{x-1} \cdot \frac{1}{\ln(3)}$$

c) $f(x) = e^{(2x-4)\cdot \ln(3)}$

$ED(2x-4) = \mathbb{R} \Rightarrow ED_f = \mathbb{R}$

$$f'(x) = \left(e^{(2x-4)\cdot \ln(3)}\right)'$$

$$= e^{(2x-4)\cdot \ln(3)} \cdot \left((2x-4)\cdot \ln(3)\right)'$$

$$= e^{(2x-4)\cdot \ln(3)} \cdot \ln(3)\cdot (2x-4)'$$

$$= 3^{2x-4}\cdot \ln(3) \cdot 2$$

d) $x^2+1 > 0 \Rightarrow \sqrt{x^2+1}$ existe $\forall x \in \mathbb{R}$

$\Rightarrow ED_f = \mathbb{R}$

$$\left(\exp_2\left(\sqrt{x^2+1}\right)\right)' = \left(2^{\sqrt{x^2+1}}\right)'$$

$$= \left(e^{\sqrt{x^2+1}\cdot\ln(2)}\right)'$$

$$= e^{\sqrt{x^2+1}\cdot\ln(2)} \cdot \left(\sqrt{x^2+1}\cdot\ln(2)\right)'$$

$$= 2^{\sqrt{x^2+1}} \cdot \ln(2) \cdot \left(\sqrt{x^2+1}\right)'$$

$$= 2^{\sqrt{x^2+1}} \cdot \ln(2) \cdot \frac{(x^2+1)'}{2\sqrt{x^2+1}}$$

$$= 2^{\sqrt{x^2+1}} \cdot \ln(2) \cdot \frac{2x}{2\sqrt{x^2+1}}$$

$$= 2^{\sqrt{x^2+1}} \cdot \ln(2) \cdot \frac{x}{\sqrt{x^2+1}}$$