## University of Annaba-Department of Economy

First year undergraduation
2008-2009
Analysis
Supplementary problems
Elementary Functions

Exercise 1. Simplify the following expression:

$$
\begin{equation*}
\mathcal{A}=(\exp (x)-\exp (-x))^{2}-\exp (-x)(\exp (3 x)+\exp (-x))+\exp (-\log 3)+\exp (\log 2-\log 3) . \tag{1}
\end{equation*}
$$

Exercise 2. Determine the smallest integer $n$ such that:

$$
\begin{equation*}
1-\left(\frac{4}{5}\right)^{n} \geq 0,97 \tag{2}
\end{equation*}
$$

Exercise 3. Resolve in $\mathbb{R}$ :
1.

$$
\begin{equation*}
\log \sqrt{2 x-3}+\frac{1}{2} \log x=\log (6-x) \tag{3}
\end{equation*}
$$

2. 

$$
\begin{equation*}
\log \left(\log \exp (x)+\log \exp \left(\frac{1}{x}\right)\right)=1-\log (x) . \tag{4}
\end{equation*}
$$

3. 

$$
\begin{equation*}
\exp \left(\frac{3}{x}\right)-\exp (x+2) \geq 0 \tag{5}
\end{equation*}
$$

4. 

$$
\begin{equation*}
\log \left(\frac{2 x+1}{x-1}\right) \leq 0 \tag{6}
\end{equation*}
$$

5. 

$$
\begin{equation*}
\log _{a} x>\log _{a}(3 x+2) \tag{7}
\end{equation*}
$$

Exercise 4. Resolve in $\mathbb{R} \times \mathbb{R}$ :

$$
\left\{\begin{array}{l}
\exp (x) \times \exp (y)=\exp (30)  \tag{8}\\
\log (x)+\log (y)=3 \log (6)
\end{array}\right.
$$

Exercise 5. Determine the domain of definition of the following functions and compute their derivatives:
1.

$$
\begin{equation*}
f(x)=\log \left(x^{2}\right) \tag{9}
\end{equation*}
$$

2. 

$$
\begin{equation*}
f(x)=(\log (x))^{2} \tag{10}
\end{equation*}
$$

3. 

$$
\begin{equation*}
f(x)=\exp (-\sin x) \tag{11}
\end{equation*}
$$

4. 

$$
\begin{equation*}
f(x)=\exp (x) \log x . \tag{12}
\end{equation*}
$$

5. 

$$
\begin{equation*}
f(x)=\frac{\log (x-1)}{2 x+3} \tag{13}
\end{equation*}
$$

