التابع اللوغاريتمي

التابع $\ln x$ معرف ومستمر واشتقاقي على $]0,+\infty[$

$\ln(e)=1$ و $\ln(1)=0$ و $e\approx 2.7182$

$$\ln x = a \leftrightarrow x = e^{a}$$

$$\ln e^{x} = x \quad , x \in R$$

$$\ln(x) < 0 \leftrightarrow 0 < x < 1$$

$$\ln(x) = 0 \leftrightarrow x = 1$$

$$\ln(x) > 0 \leftrightarrow x > 1$$

$$\ln(x) < 1 \leftrightarrow 0 < x < e$$

$$\ln(x) = 1 \leftrightarrow x = e$$

$$\ln(x) > 1 \leftrightarrow x > e$$

$$[\ln x]' = \frac{1}{x}$$

$$[\ln u(x)]' = \frac{u'}{u} \quad , u(x) > 0$$

$x > 0$ و $y > 0$

$$\ln(x.y) = \ln(x) + \ln(y)$$

$$\ln\left(\frac{x}{y}\right) = \ln(x) - \ln(y)$$

$$\ln\left(\frac{x}{y}\right) = -\ln\left(\frac{y}{x}\right)$$

$$\ln\left(\frac{1}{x}\right) = -\ln(x)$$

$$\ln(x^{n}) = n.\ln(x)$$

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

$$\ln(\sqrt[n]{x}) = \ln\left(x^{\frac{1}{n}}\right) = \frac{1}{n}\ln(x)$$

$$\lim_{x\to 0^+}[\ln x] = -\infty$$

$$\lim_{x\to +\infty}[\ln x] = +\infty$$

$$\lim_{x\to 0^+}[x\ln x] = 0$$

$$\lim_{x\to +\infty}\left[\frac{\ln x}{x}\right] = 0$$

$$\lim_{x\to +\infty}\left[\frac{x}{\ln x}\right] = +\infty$$

$$\lim_{x\to 0}\left[\frac{ln(x+1)}{x}\right] = 1$$

$$\lim_{x\to 0}\left[\frac{x}{ln(x+1)}\right] = 1$$

$$\lim_{x\to +\infty}\left[\frac{ln(x+1)}{x}\right] = 0$$

$$\lim_{x\to +\infty}\left[\frac{x}{ln(x+1)}\right] = +\infty$$

$$\lim_{x\to 1}\left[\frac{lnx}{(x-1)}\right] = 1$$

$$\lim_{x\to 1}\left[\frac{(x-1)}{lnx}\right] = 1$$

$$\lim_{x\to 0^+}[x\ln x] = 0^-$$

$$\lim_{x\to 0^+}\left[\frac{1}{x\ln x}\right] = -\infty$$

$$\lim_{x\to 1^-}\left[\frac{1}{x\ln x}\right] = -\infty$$

$$\lim_{x\to 1^+}\left[\frac{1}{x\ln x}\right] = +\infty$$