e ,ln

( ) > 0

( ) < 0

$(\quad -2)e \qquad < 0$ [redacted]

$(-\infty, 0) \qquad (\quad -2)e \quad > -2 \qquad (\quad) > -2 + \quad (\quad -1)^2$ [redacted]

$= 1 \pm \sqrt{2} \qquad {}_0 < 0 \qquad {}_0 < 1 - \sqrt{2} \qquad (\, {}_0) > -2 + \quad (\, {}_0 -$ [redacted] $0) \qquad {}_0$

$< 0 \qquad e \quad < 1 \qquad (\quad -2)e \quad > \quad -2$ [redacted] $-2 \qquad -2 \quad 2$

$(\quad -1)^2 > \quad {}^2 \qquad (\quad) > \quad -2 + \quad (\quad -1)^2 > 2 \quad + \quad {}^2$ [redacted] $2 \quad + \quad {}^2 = 0 \qquad = -\frac{2}{}$

${}_0 < -2 \qquad {}_0 < -\frac{2}{} \qquad (\, {}_0) > 2 \, {}_0 + \quad {}_0^{\,2} > 0 \qquad {}_0$

$e \quad \geq 1 +$

$(\quad) = \quad e^2 \quad + (\quad -2)e \quad -$

$(\quad)$

$'(\quad) = (\qquad -1)(2 \quad +1) \qquad 0 \qquad (\quad)$

$> 0 \qquad (\quad) \quad (-\infty, -\ln \quad) \qquad (-\ln \quad , +\infty) \qquad = -\ln$

$(-\ln \quad) = 1 - \frac{1}{} + \ln \qquad 0 < \quad < 1 \qquad (-\ln \quad) < 0$

$\lim_{\to -\infty} (\quad) = +\infty \qquad \lim_{\to +\infty} (\quad) = +\infty \qquad (\quad)$

$(-\infty, -\ln \quad) \qquad (\quad) = \quad e^2 \quad + (\quad -2)e \quad - \quad > -2e \quad - \qquad < 0$

$-2e \quad - \quad > -2 - \qquad -2 - \quad = 0 \qquad = -2 \qquad (-2) > -2 - (-2) = 0 \qquad -2 < 0 < -\ln$

$(\ ) = \ e^2 \ + (\ -2)e \ - \ > \ e^2 \ + (\ -2)e \ - e \ = \ e \ \left(e \ +1 - \frac{3}{\ }\right)$

${}_0 = \ln\left(\frac{3}{\ } - 1\right)$ $\left(\ {}_0\right) > 0$ $\ln\left(\frac{3}{\ } - 1\right) > 1$ $\ln\left(\frac{3}{\ } - 1\right)$

$(\ ) = e \ - \ {}^2$ $(\ )$ $(0, +\infty)$

$'(\ ) = e \ -2$ $'(\ ) = 0$ $(\ )$

$(\ ) = 1 - \frac{\ {}^2}{e}$ $(\ )$ $(0, +\infty)$ $(\ )$ $(0, +\infty)$

≤ 0 $'(\ ) = \frac{(\ -2)}{e}$ > 0 $(\ )$

$(0,2)$ $(2, +\infty)$ $= 2$ $(2) = 1 - \frac{4}{e^2}$ $> \frac{e^2}{4}$

$(2) < 0$ $(0) = 1$ $\lim\limits_{\to +\infty} (\ ) = 1$

$(2, +\infty)$ $(2, +\infty)$ $e \ \geq \ +1 >$ $e^{\frac{\ }{3}} \geq \frac{\ }{3}$

$e \ \geq \frac{\ {}^3}{27}$ $(\ ) = 1 - \frac{\ {}^2}{e} > 1 - \frac{\ {}^2}{\frac{\ {}^3}{27}} = 1 - \frac{27}{\ }$ $1 - \frac{27}{\ } = 0$ $= 27$

$\left(27 \ \right) > 0$ $27 \ > 1$ 27 $> \frac{e^2}{4}$ $(\ )$

$< \frac{e^2}{4}$ $(\ )$ $= \frac{e^2}{4}$ $(\ )$

$= \frac{e^2}{4}$

e α $\to +\infty$ e $\frac{\ {}^3}{27}$ ^{2}

$( )$ $\to +\infty$ $1-\frac{27}{}=0$

$\ln$

$( )=\ln + +1$ $_1$，$_2$

$'( )=\frac{1}{}+$ <0 $( )$ $\left(0,-\frac{1}{}\right)$ $\left(-\frac{1}{},+\infty\right)$

$=-\frac{1}{}$ $\left(-\frac{1}{}\right)=\ln\left(-\frac{1}{}\right)$ $-1< <0$

$\left(-\frac{1}{}\right)>0$ $\lim_{\to 0^+}( )=-\infty$ $\lim_{\to +\infty}( )=-\infty$

.

$\left(0,-\frac{1}{}\right)$ $\frac{1}{e}$ $\left(\frac{1}{e}\right)=\ln\left(\frac{1}{e}\right)+\frac{}{e}+1=\frac{}{e}<0$ $\frac{1}{e}$

$\left(-\frac{1}{},+\infty\right)$ $\ln \le -1$ $\ln\sqrt{} \le \sqrt{}-1$ $\ln \le 2\left(\sqrt{}-1\right)<2\sqrt{}-1$

$( )=\ln + +1<2\sqrt{}+$ $2\sqrt{}+ =0$ $=\frac{4}{_2}$ $\left(\frac{4}{_2}\right)<0$

$\frac{4}{_2}>-\frac{1}{}$ $\frac{4}{_2}$

$\ln \le -1$

-1 $\to +\infty$

$\ln \le 2\left(\sqrt{}-1\right)<2\sqrt{}-1$ $2\sqrt{}-1$ $\to +\infty$

$( )=\ln\frac{e}{2}-$ $( )=\frac{-4}{}$ >0 $( )=( )-( )$

$( )=( )-( )=\ln\frac{}{2}-\left(-\frac{4}{}\right)$ $'( )=\frac{1}{}-\frac{4}{_2}$ $0< <\frac{1}{4}$ $( )$

$(0, _1)$ $(_1, _2)$ $(_2,+\infty)$ $(2)=0$

$_1<2<_2$ $(_1)<0$ $(_2)>0$ $\lim_{\to 0^+}( )=+\infty$ $\lim_{\to +\infty}( )=-\infty$ $( )$

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$(0, {}_1)$ $< \frac{1}{}$ < 1 $(\ ) = \ln\frac{}{2} - \ + \frac{4}{} > \ln \ + \frac{4}{} - 2$

$\ln \ \le \ -1$ $\ln\frac{1}{} \le \frac{1}{} - 1$ $\ln \ \ge 1 - \frac{1}{}$ $\sqrt{}$ $\ln\sqrt{} \ge 1 - \frac{1}{\sqrt{}}$ $\ln \ \ge 2 - \frac{2}{\sqrt{}}$

$(\ ) > \ln \ + \frac{4}{} - 2 > 2 \cdot \frac{2 \ - \sqrt{}}{}$ $2 \ - \sqrt{} = 0$ $= 4^{2}$ $4^{2} < \frac{1}{}$

$(4^{2}) > 0$ $4^{2} < \frac{1}{}$ 4^{2} .

$(\ {}_2, +\infty)$ > 4 $\frac{4}{} < 1$ $(\ ) = \ln\frac{}{2} - \ + \frac{4}{} < \ln \ - \ + 2$

$\ln \ \le \ -1$ $\ln \ < 2\sqrt{} - 2$ $(\ ) < 2\sqrt{} - 2 - \ + 2 = 2\sqrt{} -$ $2\sqrt{} - \ = 0$

$= \frac{4}{{}^2}$ $\left(\frac{4}{{}^2}\right) < 0$ $\frac{4}{{}^2} > 4$ $\frac{4}{{}^2}$.

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