$\{0\cdot\infty\}$

$$\lim_{x\to 0} \sin x \cdot (\ln x)^2 = \lim_{x\to 0} \frac{\frac{1}{\sin x}\cdot(\ln x)^2}{\frac{1}{\sin x}} = \lim \frac{(\ln x)^2}{\left(\frac{1}{\sin x}\right)} = \left\{\frac{\infty}{\infty}\right\} =$$

(Cotf)

$$= \lim_{x\to 0} \frac{\frac{2\ln x}{x}}{\frac{-\cos x}{\sin^2 x}} = \lim_{x\to 0} \frac{\frac{2\ln x}{x}}{\frac{-\cot x}{\sin x}}) = \lim_{x\to 0} -\frac{2\ln x \cdot \sin x}{\cot x \cdot x} \to 1 =$$

$$= -\lim_{x\to 0} \frac{2\ln x}{\cot x} = \left\{\frac{\infty}{\infty}\right\} = \left(\frac{\frac{2}{x}}{\frac{-1}{\sin^2 x}}\right) = -\lim_{x\to 0} \frac{2\sin^2 x}{x} =$$

(Cotf)

$$\lim_{x\to 0} \frac{2\sin x \cdot \sin x}{x} = \lim_{x\to 0} 2\sin x = \boxed{0}$$

$\downarrow$

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