QUIZ 5.

Name: ______

Fill in the blanks.

For the function $f(x) = \left[\frac{\arcsin(x)}{x}\right]^{\frac{1}{x^2}}$, the limit $\lim_{x\to 0^+} f(x)$ can be computed as follows: via the substitution $y = \arcsin(x)$, $x = \sin(y)$ we get $\lim_{x\to 0^+} f(x) = \lim_{y\to 0^+} g(y)$ where

$$g(y) = \boxed{}$$

Here, $\ln[g(y)] = \left[\frac{y}{\boxed{}}\right]^2 \cdot h(y)$, where $h(y) = \frac{\boxed{}}{y^2}$.

The limit $\lim_{y\to 0^+} h(y)$ has indeterminate form $\boxed{}$, so by L'H,

$$\lim_{y\to 0^+} h(y) = \frac{1}{2} \lim_{y\to 0^+} \frac{\boxed{}}{y^2 \cdot \sin(y)}.$$

This limit has indeterminate form $\boxed{}$, so by L'H again,

$$\lim_{y\to 0^+} h(y) = \frac{1}{2} \lim_{y\to 0^+} \frac{\boxed{}}{2y \cdot \sin(y) + y^2 \cdot \cos(y)}$$

$$= \frac{1}{2} \lim_{y\to 0^+} \frac{\frac{\sin(y)}{y}}{2 \cdot \frac{\sin(y)}{y} + \cos(y)} = \frac{1}{2} \cdot \frac{1}{2\cdot 1 + 1} = \frac{1}{6}.$$

Thus $\lim_{y\to 0^+} \ln[g(y)] = \boxed{}$ and $\lim_{x\to 0^+} f(x) = \lim_{y\to 0^+} g(y)$

$$= \boxed{}.$$