

[2.5 pts.]

① $\lim_{x \rightarrow \infty} \frac{\ln x}{\sqrt{x}} = \lim_{x \rightarrow \infty} \frac{\frac{1}{x}}{\frac{1}{2\sqrt{x}}} = \lim_{x \rightarrow \infty} \frac{2}{\sqrt{x}} = \boxed{0}$

(1/2 pt.) \rightarrow (1 pt.) derivatives (1/2 pt.) (1/2 pt.)

[2.5 pts.]

② $\lim_{x \rightarrow 0} \frac{x \cdot 3^x}{3^x - 1} = \lim_{x \rightarrow 0} \frac{3^x + x \cdot 3^x \ln 3}{3^x \ln 3} = \boxed{\frac{1}{\ln 3}}$

(1/2 pt.) \rightarrow (1.5 pts.) derivatives (1/2 pt.)

[5 pts.]

③ $\lim_{x \rightarrow 0^+} x (\ln(5x))^2 = \lim_{x \rightarrow 0^+} \frac{(\ln(5x))^2}{\frac{1}{x}}$ Rewrite: (1 pt.)

(1/2 pt.) \rightarrow (1/2 pt.) \rightarrow (1/2 pt.) \rightarrow (1/2 pt.) \rightarrow (1/2 pt.)

$= \lim_{x \rightarrow 0^+} \frac{2 \ln(5x) \cdot \frac{1}{x}}{-\frac{1}{x^2}}$ Derivatives: (1 pt.)

$= - \lim_{x \rightarrow 0^+} 2x \ln(5x)$

$= - \lim_{x \rightarrow 0^+} 2 \frac{\ln(5x)}{\frac{1}{x}}$ Rewrite: (1 pt.)

$= - \lim_{x \rightarrow 0^+} 2 \frac{\frac{1}{x}}{-\frac{1}{x^2}} = - \lim_{x \rightarrow 0^+} (-2x) = \boxed{0}$

(1/2 pt.) \rightarrow (1/2 pt.) Derivatives: (1/2 pt.) (1/2 pt.)