

(1) [5] Simplify $\tan(\cos^{-1} x)$. (Your final simplified answer should not contain any trigonometric or inverse trigonometric functions.)

(2) [5] Determine $\lim_{x \rightarrow 0^-} \coth(x)$. (Recall that $\coth(x) = 1/\tanh(x)$.)

(3) [5] Determine the derivative: $f(x) = x^2 \ln(\arcsin(x))$.