

(1) [5] Determine the exact value of $\tan^{-1}(\sqrt{3})$.

(2) [5] Simplify $\sin(\tan^{-1}x)$. (Your final simplified answer should not contain any trigonometric or inverse trigonometric functions.)

(3) [5] Determine $\lim_{x \rightarrow 0^-} \coth(x)$. (Recall that $\coth(x) = 1/\tanh(x)$.)