

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

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

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