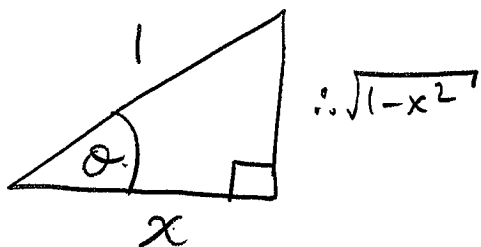


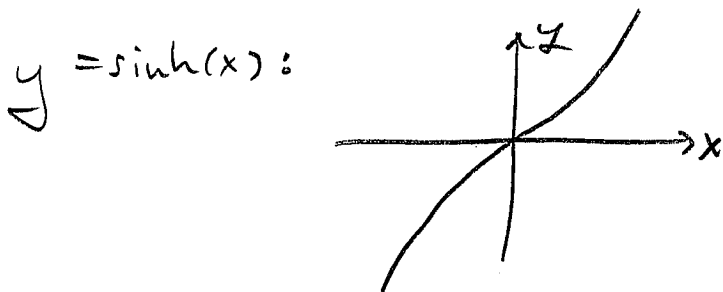
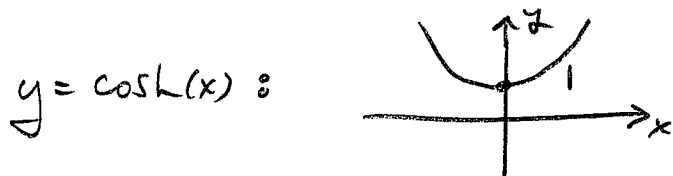
(1) [5] Simplify $\tan(\cos^{-1} x)$. (Your final simplified answer should not contain any trigonometric or inverse trigonometric functions.)

$$\text{Let } \theta = \cos^{-1} x \Rightarrow \cos \theta = \frac{x}{1}$$



$$\therefore \tan(\cos^{-1} x) = \tan \theta = \frac{\sqrt{1-x^2}}{x}$$

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



$$\lim_{x \rightarrow 0^-} \coth(x) = \lim_{x \rightarrow 0^-} \frac{\cosh(x)}{\sinh(x)} \left\{ \begin{array}{l} \rightarrow 1 \\ \rightarrow 0^- \end{array} \right.$$

$$= -\infty$$

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

$$f'(x) = 2x \ln(\arcsin(x)) + x^2 \frac{1}{\arcsin(x)} \cdot \frac{1}{\sqrt{1-x^2}}$$