ANA 08.

10. $h: (-\frac{\pi}{2}, \frac{\pi}{2}) \to \mathbb{R} \qquad h(t) = (\cos(t))^{\sin(t)}$

ges: h'

$(\cos(t))^{\sin(t)} = \exp(\sin(t) \cdot \ln(\cos(t)))$

$(\exp(\sin(t) \cdot \ln(\cos(t))))' = \exp(\sin(t) \cdot \ln(\cos(t))) \cdot (\cos(t) \cdot \ln(\cos(t)) + \sin(t) \cdot \frac{1}{\cos(t)} \cdot (-\sin(t)))$

$= (\cos(t))^{\sin(t)} \cdot (\cos(t) \cdot \ln(\cos(t)) - \tan(t)\sin(t))$

$f: (-\frac{\pi}{2}, \frac{\pi}{2}) \to (0,1) \times (-1,1) \quad f(t) = \begin{pmatrix} \cos(t) \\ \sin(t) \end{pmatrix}$

$g: (0,1) \times (-1,1) \to \mathbb{R} \qquad g\begin{pmatrix} \xi \\ \eta \end{pmatrix} = \xi^{\eta} \qquad \Rightarrow h = g \circ f$

ges: $(g \circ f)'$

$df(t) = \begin{pmatrix} -\sin(t) \\ \cos(t) \end{pmatrix}$

$dg\begin{pmatrix} \xi \\ \eta \end{pmatrix} = \begin{pmatrix} \frac{dg}{d\xi}\begin{pmatrix} \xi \\ \eta \end{pmatrix} \\ \frac{dg}{d\eta}\begin{pmatrix} \xi \\ \eta \end{pmatrix} \end{pmatrix} = \begin{pmatrix} \eta \cdot \xi^{\eta-1} \\ \xi^{\eta} \cdot \ln(\xi) \end{pmatrix}$

$d(g \circ f)(t) = dg(f(t)) \cdot df(t) = \begin{pmatrix} \sin(t) \cdot \cos(t)^{\sin(t)-1} \\ \cos(t)^{\sin(t)} \ln(\cos(t)) \end{pmatrix}^{T} \cdot \begin{pmatrix} -\sin(t) \\ \cos(t) \end{pmatrix}$

$= -(\sin(t))^2 \cos(t)^{\sin(t)-1} + \cos(t)^{\sin(t)+1} \ln(\cos(t))$

$= (\cos(t))^{\sin(t)} \cdot (\cos(t) \cdot \ln(\cos(t)) - \sin(t) \cdot \tan(t))$