Tutorial 6

Question 1.

Prove that $\dfrac{d}{dx}(\cos x) = -\sin x$.

Question 2.

Determine where each of the following functions is differentiable, and find their derivatives.

(a) $f\colon \mathbb{R} \longrightarrow \mathbb{R}, \quad x \longmapsto 3x^5 - 6x^3 + \cos x$

(b) $g\colon \mathbb{R} \longrightarrow \mathbb{R}, \quad x \longmapsto |x|$

(c) $h\colon [-1,1] \longrightarrow [0,1], \quad x \longmapsto \sqrt{1-x^2}$

(d) $k\colon \mathbb{R} \longrightarrow \mathbb{R}, \quad x \longmapsto \begin{cases} x^2 & \text{if } x \in \mathbb{Q} \\ 0 & \text{otherwise} \end{cases}$

Question 3.

Find the equation of the line tangent to the graph of the function

$$]-\tfrac{\pi}{2}, \tfrac{\pi}{2}[\longrightarrow \mathbb{R}, \quad x \longmapsto \tan x$$

at the points $(0,0)$ and $(\frac{\pi}{4}, 1)$.