Due Wednesday 24 September

(1) Use the derivative to estimate the value of \(\cos(0.02\cos(-0.03))\).

(2) Section 2.5 p.159-163
   (a) # 11.
   (b) # 15.
   (c) # 24.

(3) Section 2.6 p.171-173
   (a) # 4(b).
   (b) # 14(a).
   (c) # 15.

(4) The surface of a mountain is given by the set of points \((x, y, z)\) in \(\mathbb{R}^3\) satisfying
    \[ z = 20 - \left(\frac{x}{10}\right)^2 - \left(\frac{y}{20}\right)^4 \] and \(x, y, z \geq 0\). Klaus is at the point \((10, 20, 18)\) and he wants
to toboggan down the mountain in the steepest direction possible. In which direction
should he go?

(5) A \(2 \times 2\) matrix of real numbers
    \[
    \begin{pmatrix}
    a & b \\
    c & d
    \end{pmatrix}
    \]
can be identified with the point \((a, b, c, d)\) \(\in \mathbb{R}^4\). We can therefore define a map
\(f : \mathbb{R}^4 \rightarrow \mathbb{R}^4\) by \(f(A) = A^2\), the square of the matrix \(A\). Calculate the derivative of
\(f\) at an arbitrary point \(B \in \mathbb{R}^4\) (also regarded as a matrix).