MATH 2220 HW4.

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 $z = 20 - (\frac{x}{10})^2 - (\frac{y}{20})^4$ 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 2×2 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 $f : \mathbb{R}^4 \to \mathbb{R}^4$ 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).