1. (a) When are two functions equal? Give several examples and counter-examples (play also with the interval of definition).

   (b) Let f be defined by $f(x) = \dfrac{x^2-4}{x-2}$, g by $g(x) = x+2$, and h by $h(u) = u+2$. Which of the previous three functions are equal?

   Ask the students to complete this after having asked and discussed the two following questions (that can be asked as clicker questions) on whether or not two functions are equal.

2. (a) Draw the graph of the function $f(x) = |x|$ and write down the definition of this function (i.e. $|x| = \dots$).
   Note that this is an example of a function that is defined piecewise and that has a corner (hence non-differentiable at that point).

   (b) How can we "modify" this function to shift it horizontally by 2 units to the right and vertically upward by 3 units (i.e. we want the vertex of the function to lie at $(2,3)$)?

   (c) Let $g(x) = x^2 - 3x - 4$. Is $f(g(x)) = g(f(x))$?

3. Do we have $0 \cdot \infty = 0$, $0 \cdot \infty = \infty$ or something else?
   Underline here that ∞ is not a number and that the above expression can actually give any number.

4. (a) What is the inverse function of the $f(x) = e^x$? Write down $f^{-1}(x)$ as well as its domain and range.

   (b) Using this, find two different expressions of $x = \dots$ that use these functions. When are these expressions true?

   Here we are obviously looking for $e^{\ln x}$ and $\ln(e^x)$.
   Note that the first function is only defined for positive numbers whereas the second is defined for all real numbers.

5. In addition to the basic trigonometric functions of sine, cosine, and tangent, there are reciprocal functions as well. We will consider the secant function: $\sec x = \frac{1}{\cos x}$.

   (a) Draw the graph of the function $f(x) = \sec x$ and write down the definition of this function.

   (b) Let $g(x) = \arccos x$ be the inverse of the cosine function. Is $f(x) = g(x)$?