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?

2. (a) Draw the graph of the function $f(x) = |x|$ and write down the definition of this function (i.e. $|x| = \dots$).

   (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?

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 $x = \ldots$ that use these functions. When are these expressions true?

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 $f(x) = g(x)$?