

1. Define  $f(x) = \frac{x^2 - 4}{x - 2}$ ,  $g(x) = x + 2$ , and  $h(u) = u + 2$ . Which of these 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  $g(x) = x^2 - 3x - 4$ . Are  $f \circ g$  and  $g \circ f$  equal?
  
  
  
  
  
  
  
  
  
  
3. Do we have  $0 \cdot \infty = 0$ ,  $0 \cdot \infty = \infty$  or something else?

4. (a) Write down the domain and range of  $f(x) = e^x$ . On what domain is it increasing?

(b) Is  $f(x) = e^x$  one-to-one? Is  $f(x) = e^x$  invertible? If it is, write down  $f^{-1}(x)$  as well as its domain and range.

(c) Using (a), find two different expressions which appear to be equal to  $x$ . When are these expressions well-defined?

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