

**Problem statement** Let  $a$  be a positive constant and consider the functions

$$f(x) = \arcsin\left(\frac{x}{a}\right) \quad \text{and} \quad g(x) = a \arctan\left(\frac{x}{a}\right).$$

Find the derivatives of  $f$  and  $g$  and express them in as simple a form as possible. There is a certain value of  $a$  for which the lines tangent to the graphs of these two functions at  $x = 1$  are parallel lines. Find that value of  $a$  to 3-place accuracy. (Find an exact equation satisfied by  $a$ , and then get an accurate enough solution from your calculator.)