Question 7 **(5 marks)**

The number 2021 can be expressed as a product of two consecutive prime numbers:
$43 \times 47 = 2021$.

Consider the complex equation $z^{43} = 1$.

(a) Write an expression for the roots of $z^{43} = 1$. (2 marks)

Let w be any one of the roots of the equation $z^{43} = 1$.

(b) How many of these roots will also be a solution of the equation $z^{47} = 1$?
Justify your answer. (3 marks)

(d) Determine the exact value for $g\left(f\left(0\right)\right)$. (2 marks)

(e) Determine the domain for the function $y = f\left(g\left(x\right)\right)$. Justify your answer. (3 marks)

(i) A and B. (1 mark)

(ii) C and D. (1 mark)