# 1.12 Complex numbers introduction

**1a.** *[6 marks]*

(i)     Use the binomial theorem to expand .

(ii)     Hence use De Moivre’s theorem to prove



(iii)     State a similar expression for  in terms of  and .



**1b.** *[4 marks]*

Let , where  is measured in degrees, be the solution of  which has the smallest positive argument.

Find the value of  and the value of .

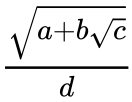


**1c.** *[4 marks]*

Using (a) (ii) and your answer from (b) show that .



**1d.** *[5 marks]*

Hence express  in the form  where .



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