

MT1612: EXAMPLE SHEET¹ II (for Feb. 17, 1999)

1.) Find the modulus and argument of

(i) $\frac{(-\sqrt{3}-i)^5}{(-\sqrt{2}+i\sqrt{2})^7},$

(ii) $\frac{(1+i)^8}{(1-i\sqrt{3})^4}.$

Express (ii) in cartesian form.

2.) Show that

(i) $(2 + 3i)^{11} = -246046 - 1315911 i,$

(ii) $(-1 + 2i)^{13} = 8839 + 33802 i.$

[What do you notice when you use a pocket calculator during the numerical evaluation?]

3.) Use De Moivre's theorem to transform the following trigonometric expressions:

(i) Express $\cos 4\varphi$ in terms of $\cos \varphi$.

(ii) Express $\sin 3\varphi$ in terms of $\sin \varphi$.

4.) Find *all* roots of the equations

(i) $w^6 = 1,$

(ii) $w^4 = -8 + i 8\sqrt{3}.$

In each case sketch the positions of the roots in the Argand plane and give the values of the roots in cartesian form.

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