Complex Numbers - 2022 A2 June

1. March/2022/Paper_9709/32/No.2

On a sketch of an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $|z+2-3i| \le 2$ and $\arg z \le \frac{3}{4}\pi$. [4]



2.	March/2022/Paper_9709/32/No.6
	Find the complex numbers w which satisfy the equation $w^2 + 2iw^* = 1$ and are such that $\text{Re } w \le 0$ Give your answers in the form $x + iy$, where x and y are real.
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The	e complex number u is defined by $u = \frac{\sqrt{2-u\sqrt{21}}}{1+2i}$, where a is a positive integer.	
(a)	Express u in terms of a , in the form $x + iy$, where x and y are real and exact.	[3]
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3. June/2022/Paper_9709/31/No.7

It is now given that a = 3. **(b)** Express u in the form $re^{i\theta}$, where r > 0 and $-\pi < \theta \le \pi$, giving the exact values of r and θ . (c) Using your answer to part (b), find the two square roots of u. Give your answers in the form $re^{i\theta}$, where r > 0 and $-\pi < \theta \le \pi$, giving the exact values of r and θ . [3]

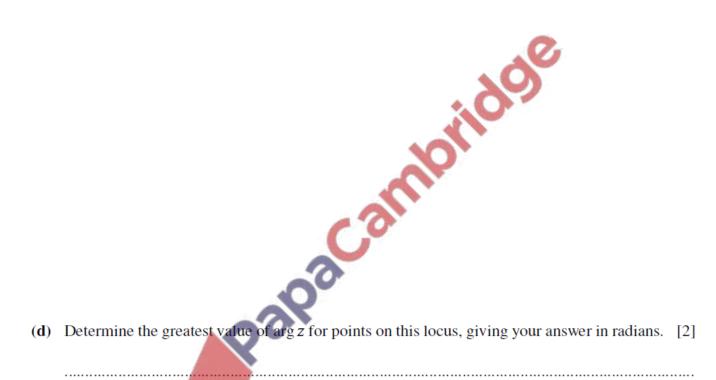
4. June/2022/Paper_9709/32/No.10 The complex number $-1 + \sqrt{7}i$ is denoted by u. It is given that u is a root of the equation

$$2x^3 + 3x^2 + 14x + k = 0,$$

where k is a real constant.

(a)	Find the value of k .	[3]
(b)	Find the other two roots of the equation.	[4]
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(c)	On an Argand diagram, sketch the locus of points representing complex numbers	z satisfying
	the equation $ z-u =2$.	[2]



The	complex number $3 - i$ is denoted by u .
(a)	Show, on an Argand diagram with origin O , the points A , B and C representing the complex numbers u , u^* and $u^* - u$ respectively.
	State the type of quadrilateral formed by the points O, A, B and C . [3]
(b)	Express $\frac{u^*}{u}$ in the form $x + iy$, where x and y are real. [3]
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5. June/2022/Paper_9709/33/No.5

By considering the argument of $\frac{u}{u}$, or otherwise, prove that $\tan^{-1}(\frac{3}{4}) = 2\tan^{-1}(\frac{1}{3})$.	
\mathcal{O}_{i}	
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