1. Nov/2023/Paper_9709/31/No.2

On an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $|z-2\mathrm{i}| \leqslant |z+2-\mathrm{i}|$ and $0 \leqslant \arg(z+1) \leqslant \frac{1}{4}\pi$. [4]

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2. Nov/2023/Paper_9709/31/No.4

The complex number u is defined by $u = \dfrac{3 + 2i}{a - 5i}$, where a is real.

(a) Express u in the Cartesian form $x + iy$, where x and y are in terms of a. [3]

(b) Given that $\arg u = \frac{1}{4}\pi$, find the value of a. [2]

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3. Nov/2023/Paper_9709/32/No.4

(a) On a sketch of an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $|z - 4 - 3i| \leqslant 2$ and $\operatorname{Re} z \leqslant 3$. [4]

(b) Find the greatest value of $\arg z$ for points in this region. [2]

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4. Nov/2023/Paper_9709/32/No.8

It is given that $\dfrac{2+3a\mathrm{i}}{a+2\mathrm{i}} = \lambda(2-\mathrm{i})$, where a and λ are real constants.

(a) Show that $3a^2 + 4a - 4 = 0$. [4]

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(b) Hence find the possible values of a and the corresponding values of λ. [3]

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5. Nov/2023/Paper_9709/33/No.2

On an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $|z - 1 + 2i| \leqslant |z|$ and $|z - 2| \leqslant 1$. [5]

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6. Nov/2023/Paper_9709/33/No.4

Solve the quadratic equation $(3+\mathrm{i})w^2 - 2w + 3 - \mathrm{i} = 0$, giving your answers in the form $x + \mathrm{i}y$, where x and y are real. [5]

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