AQA – Complex numbers – A2 Further Mathematics P2

1. June/2020/Paper_2/No.2

Given that $\arg(a + bi) = \varphi$, where a and b are positive real numbers and $0 < \varphi < \frac{\pi}{2}$, three of the following four statements are correct.

Which statement is **not** correct?

Tick (✓) **one** box.

[1 mark]

$\arg(-a - bi) = \pi - \varphi$ ☐

$\arg(a - bi) = -\varphi$ ☐

$\arg(b + ai) = \frac{\pi}{2} - \varphi$ ☐

$\arg(b - ai) = \varphi - \frac{\pi}{2}$ ☐

2. June/2019/Paper_2/No.1

Given that z is a complex number, and that z^* is the complex conjugate of z, which of the following statements is **not** always true?

Circle your answer.

[1 mark]

$(z^*)^* = z$ $\quad zz^* = |z|^2$ $\quad (-z)^* = -(z^*)$ $\quad z - z^* = z^* - z$

3. June/2019/Paper_2/No.6

A circle C in the complex plane has equation $|z - 2 - 5\text{i}| = a$

The point z_1 on C has the least argument of any point on C, and $\arg(z_1) = \dfrac{\pi}{4}$

Prove that $a = \dfrac{3\sqrt{2}}{2}$

[6 marks]

4. June/2019/Paper_2/No.12

Abel and Bonnie are trying to solve this mathematical problem:

> $z = 2 - 3\text{i}$ is a root of the equation
> $2z^3 + mz^2 + pz + 91 = 0$
>
> Find the value of m and the value of p.

Abel says he has solved the problem.

Bonnie says there is not enough information to solve the problem.

(a) Abel's solution begins as follows:

> Since $z = 2 - 3\text{i}$ is a root of the equation,
> $z = 2 + 3\text{i}$ is another root.

State **one extra** piece of information about m and p which could be added to the problem to make the beginning of Abel's solution correct.

[1 mark]

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(b) Prove that Bonnie is right.

[4 marks]