BHASVIC MαTHS

A2 Doubles summer assignment *1*

Section: *Core*

Present

1. Find the following:

(a) $(6 + 4i) – (3 – 5i)$ (b) $3(6 + 4i) + 2(3 – 5i)$ (c) $3i(6 + 4i) + 2i(3 – 5i)$

(d) $(6 + 4i)^2$ (e) $(6 + 4i)(3 – 5i)$ (f) $(6 + 4i)(6 – 4i)$

(g) $(6 + 4i)(6 – 4i)(3 – 5i)(3 + 5i)$ (h) $(3 – 7i)^3$ (i) $(2 + 2i)(3 – 7i)(5 – i)$

2. Find real numbers a and b such that:

(a) $(a + bi)(3 – 2i) = 5i + 1$ (b) $(6 + i)(a + bi) = 2$ (c) $(a + 2i)(1 + 2i) = 4 – bi$

(d) $(1 + ai)(1 + i) = b + 2i$ (e) $(a + bi)(2 + i) = 2a - (b – 1)i$ (f) $i(a + bi) = a - 6i$

3. By writing $z = x + iy$, solve these equations:

(a) $z^2 = -4i$ (b) $z^2 = 9i$ (c) $z^2 = 2 + 2\sqrt{3}i$ (d) $z^2 = 5 + i$

4. Write the following in the form $x + iy$

(a) $\frac{3-2i}{1+2i}$ (b) $\frac{4i}{3-5i}$ (c) $\frac{4+i}{4-i}$ (d) $\frac{2i+1}{2i-1}$ (e) $\frac{(1+i)^2}{1-i}$ (f) $\frac{(i-2)^2}{i+2}$

5. Solve these equations:

(a) $(1 + i)z = 3 + i$ (b) $(2 – i)z + (2 – 6i) = 4 – 7i$

(c) $(3 – 4i)(z – 1) = 10 – 5i$ (d) $(3 + 5i)(z + 2 – 5i) = 6 + 3i$

6. Find the values of a and b such that $\frac{a}{3+i} + \frac{b}{1+2i} = 1 - i$ where a and b are real numbers.

7. Solve these simultaneous equations:

$(1 + i)z + (2 – i)w = 3 + 4i$

$iz + (3 + i)w = -1 + 5i$

8. Given that $2 + 3i$ is one of the roots of a quadratic equation with real coefficients, find the quadratic equation.

9. Find the complex number Z such that $3z + 2z^* = 5 + 2i$

10. Solve the simultaneous equations:

$2z – 3iw = 5$

$(1 + i)z + 3w = -4i$

11. Solve the equation $2z – 3 = 4 – 3(i + z)$

12. Solve the equation $z + 2z^* = 2 – 7i$

13. If $a = 1 + i,\ b = 2 – i,\ c = 2 + 3i$, express the following in the form x + iy:

(i) $a + b$ (ii) $a + 2b – c$ (iii) ab

(iv) a^2c (v) $(a + b)c^2$ (vi) $a^2 + b^2$

Future

1. Given that $\alpha = 2 + i$ is one of the roots of a quadratic equation with real coefficients,

(a) state the value of the other root β

(b) find the quadratic equation

(c) find the values of $\alpha + \beta$ and $\alpha\beta$ and interpret the results