

BHASVIC MaTHS

A2 Doubles summer assignment 3

Section: *Core*

Past

1. Write $\frac{3-5i}{2i-1}$ in the form $a + bi$
2. Solve the simultaneous equations:
 $(1 - i)z + 2iw = i$
 $(1 + i)z + (1 - i)w = 1$
3. Solve the equation $2iz + 1 = 4i(z - 3)$
4. Solve the equation $2z + iz^* = -3 - i$
5. Solve the following equations, giving their roots in the form $a + bi$ (where either a or b may be zero).
(a) $x^2 + 4x + 20 = 0$ (b) $x^2 + 4x + 7 = 0$ (c) $x^2 + 25 = 0$
(d) $x^2 + 2ix - 2 = 0$ (e) $x^2 + 2ix + 2 = 0$
6. On an Argand diagram, sketch the locus of points where $|z - 3i| = |z + 6|$
7. Shade the region on an Argand diagram where $\frac{\pi}{6} < \arg(z) < \frac{2\pi}{3}$.
8. a) On the same diagram, sketch the locus of $|z + 1| = |z - 3|$ and $\arg(z) = \frac{\pi}{4}$.
b) Hence, find the complex number z that satisfies both equations.

Present

1. Find $\sum_{r=1}^n (2r^3 + r)$

2. (a) Write $\frac{2}{r(r+2)}$ in the form $\frac{A}{r} + \frac{B}{r+2}$
 (b) Hence find $\sum_{r=1}^n \frac{2}{r(r+2)}$
3. (a) Find $\sum_{r=1}^n r(r+1)(r+2)$
 (b) Hence find $1 \times 2 \times 3 + 2 \times 3 \times 4 + 3 \times 4 \times 5 + \dots + 100 \times 101 \times 102$.
4. (a) Show that $\frac{1}{3}(r+1)(r+2)(r+3) - \frac{1}{3}r(r+1)(r+2) = (r+1)(r+2)$.
 (b) using the result from (a) and the method of differences,
 find $\sum_{r=1}^n (r+1)(r+2)$
 (c) Use standard results to find $\sum_{r=1}^n (r+1)(r+2)$ and show that this is the same as the result from (b).
5. (a) Find $\sum_{r=1}^n \frac{7r+10}{r(r+1)(r+2)}$
 (b) Hence find $\sum_{r=1}^{\infty} \frac{7r+10}{r(r+1)(r+2)}$

Future

1. z is a complex number satisfying $|z - 2 - 2i| = 2$. Find the maximum possible value of $\arg(z)$.