Modulus and argument

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Find the modulus and principal argument of $-\sqrt{3}-i$. [2 marks]

The modulus is $\sqrt{3+1}=2$; quadrant III and reference angle $\pi/6$ give $-5\pi/6$.

Answer: 2 and $-5\pi/6$.

2. Give all arguments of -2. [2 marks]

The negative real direction is a half-turn plus any integer number of full turns.

Answer: $\pi+2k\pi$, $k\in\mathbb{Z}$.

3. If $z=3-4i$, calculate $z\overline{z}$ and $|z|$. [2 marks]

$(3-4i)(3+4i)=9+16=25$ and $|z|=\sqrt{25}=5$.

Answer: 25 and 5.

4. Find $|(1+2i)-(4-2i)|$. [2 marks]

The difference is $-3+4i$, whose modulus is $\sqrt{9+16}=5$.

Answer: 5.

5. Is $|z+w|=|z|+|w|$ always true? Use $z=1$, $w=-1$ to justify. [3 marks]

$z+w=0$, so $|z+w|=0$; $|1|+|-1|=2$. Equality holds only in suitable aligned directions.

Answer: No: the left side is 0 but the right side is 2.

6. Find the principal argument of $2\text{cis}(-9\pi/4)$. [2 marks]

Add 2π to $-9\pi/4$, obtaining $-\pi/4$ in $(-\pi,\pi]$.

Answer: $-\pi/4$.