Complex arithmetic in both forms

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Calculate $(2-3i)+(1+5i)$. [2 marks]

Add real parts $2+1=3$ and imaginary parts $-3+5=2$.

Answer: $3+2i$.

2. Expand $(2+i)(3-2i)$. [2 marks]

$6-4i+3i-2i^2=6-i+2=8-i$.

Answer: $8-i$.

3. Simplify $\frac{2-i}{1+i}$. [2 marks]

Multiply by $\frac{1-i}{1-i}$: numerator $1-3i$, denominator 2.

Answer: $\frac{1}{2}-\frac{3}{2}i$.

4. Calculate $\frac{4\text{cis}(\frac{2\pi}{3})}{2\text{cis}(-\frac{\pi}{6})}$. [2 marks]

Divide moduli to get 2; subtract angles to get $\frac{5\pi}{6}$.

Answer: $2\text{cis}(\frac{5\pi}{6})=-\sqrt{3}+i$.

5. Find $2\text{cis}(\frac{\pi}{3})+2\text{cis}(-\frac{\pi}{3})$. [2 marks]

The terms are $1+\sqrt{3}i$ and $1-\sqrt{3}i$, so the imaginary parts cancel.

Answer: 2.

6. If $zw=6i$ and $z=1+i$, find w. [3 marks]

$w=\frac{6i}{1+i}=\frac{6i(1-i)}{2}=3+3i$.

Answer: $3+3i$.