



Precalculus

Topic: Complex Numbers

Instructions

Solve the following problems related to complex numbers. Show all work clearly and check your solutions.

Practice Problems

1. Find the real and imaginary parts of the following complex numbers.

(i) $4 - 7i$

(v) $i\sqrt{3}$

(ii) $\frac{-3+5i}{2}$

(vi) $\sqrt{3} + \sqrt{-4}$

(iii) $\frac{6-5i}{3}$

(vii) $\frac{5+3i}{2}$

(iv) $8 + 7i$

(viii) $-\frac{1}{2}$

2. Evaluate the expression and write the result in the form $a + bi$.

(i) $(3 + 4i) + (5 - 2i)$

(vi) $(2i)^4$

(ii) $(7 - i)(4 + 2i)$

(vii) $(6 + 5i)(2 - 3i)$

(iii) $(1 - 3i) + (2 + 6i)$

(viii) $\frac{1}{1+i} - \frac{1}{1-i}$

(iv) $\frac{2-3i}{1-2i}$

(ix) $(1 - 2i) + (3 + 4i)$

(v) $(3 + 2i) - (5 - 6i)$

(x) $\frac{(1+2i)(3-i)}{2+i}$

3. Evaluate the following radical expressions and express the result in the form $a + bi$.

- | | |
|---------------------------------------|--|
| (i) $\sqrt{-25}$ | (v) $\sqrt{16} + \sqrt{-9}$ |
| (ii) $\sqrt{\frac{-9}{4}}$ | (vi) $\frac{2+\sqrt{-8}}{1+\sqrt{-2}}$ |
| (iii) $\sqrt{-3} \cdot \sqrt{-12}$ | |
| (iv) $(3 - \sqrt{-5})(1 + \sqrt{-1})$ | (vii) $\sqrt{-49}$ |

4. Find all solutions of the equation and express them in the form $a + bi$:

- | | |
|--------------------------|-----------------------------------|
| (i) $x^2 + 49 = 0$ | (vi) $x^2 - 3x + 3 = 0$ |
| (ii) $x^2 - 4x + 5 = 0$ | (vii) $z + 3 + \frac{3}{z} = 0$ |
| (iii) $x^2 + 2x + 5 = 0$ | (viii) $6x^2 + 12x + 7 = 0$ |
| (iv) $x^2 + x + 1 = 0$ | |
| (v) $x^2 - 2x + 1 = 0$ | (ix) $x^2 + \frac{1}{2}x + 1 = 0$ |

Multiple-Choice Questions

1. What is the result when $6 + 3i$ is subtracted from $2 - 5i$?

- | | |
|--------------|--------------|
| A. $-4 - 8i$ | C. $-4 + 8i$ |
| B. $8 + 8i$ | D. $4 - 8i$ |

2. What is the result when $2 + 5i$ is added to $3 - 4i$?

- | | |
|-------------|-------------|
| A. $5 + i$ | C. $1 + i$ |
| B. $5 + 9i$ | D. $5 + 9i$ |

3. What is the result of dividing $(3 + 2i)$ by $1 + 4i$?

- | | |
|------------------------|-------------|
| A. $\frac{3+2i}{1+4i}$ | C. $1 + i$ |
| B. $\frac{10+11i}{17}$ | D. $2 - 4i$ |

4. What is the result of $\sqrt{-16}$?

- | | |
|----------|---------|
| A. $4i$ | C. 4 |
| B. $-4i$ | D. -4 |

5. What is the solution to the equation $2x^2 + 3x + 5 = 0$?

- | | |
|---------------------------------------|-------------------------------------|
| A. $x = \frac{-3 \pm \sqrt{9-40}}{4}$ | C. $x = \frac{-3 \pm \sqrt{16}}{4}$ |
| B. $x = -\frac{3 \pm \sqrt{9-20}}{4}$ | D. $x = \frac{-5 \pm \sqrt{16}}{4}$ |

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