Answers: Arithmetic on complex numbers

Charlotte McCarthy

Summary

Answers to questions relating to the guide on arithmetic on complex numbers.

These are the answers to Questions: Arithmetic on complex numbers.

Please attempt the questions before reading these answers!

Q1

1.1. $(5 + 7i) - (2 + 3i) = 3 + 4i$

1.2. $(8 + 6i) + (2 - 4i) = 10 + 2i$

1.3. $(4 - i\sqrt{2}) - (3 + i\sqrt{7}) = 1 - (\sqrt{2} + \sqrt{7})i$

1.4. $(\sqrt{8} + 4i) - (\sqrt{5} + 2i) = (2\sqrt{2} - \sqrt{5}) + 2i$

1.5. $(\sqrt{7} + 3i) + (2 - i) = (\sqrt{7} + 2) + 2i$

1.6. $(5 + i\sqrt{2}) - (7 - i) + (\sqrt{3} + 4i) = (\sqrt{3} - 2) + (\sqrt{2} + 5)i$

Q2

2.1. $(2 + 3i)(4 + 5i) = -7 + 22i$

2.2. $(3 + i)(2 - i) = 7 - i$

2.3. $4(6 + 3i) = 24 + 12i$

2.4. $(1 + i)^2 = 0 + 2i = 2i$

2.5. $(3 + 2i)^3 = -9 + 46i$

2.6. $(7 - 4i)^2(i - 2) = -10 + 145i$

2.7. $(1 - i\sqrt{3})^3 = -8 + 0i = -8$

2.8. $(5 - 2i)(5 + 2i) = 29 + 0i = 29$

2.9. $(\sqrt{2} + i\sqrt{3})(\sqrt{8} - i\sqrt{3}) = 7 + i\sqrt{6}$

Q3

3.1. $\dfrac{7 - 6i}{1 + 2i} = -1 - 4i$

3.2. $\dfrac{4 - i}{1 + 4i} = 0 - i = -i$

3.3. $\dfrac{3}{5i} = 0 - \dfrac{3}{5}i = -\dfrac{3}{5}i$

3.4. $\dfrac{4 + 2i}{3 - i} = 1 + i$

3.5. $\dfrac{9 + i}{i} = 1 - 9i$

3.6. $\dfrac{-2 - 2i}{-2 + 2i} = 0 + i = i$

3.7. $\dfrac{1 + 5i}{-3i} = -\dfrac{5}{3} + \dfrac{1}{3}i$

3.8. $\dfrac{-4}{1 - i} = -2 - 2i$

3.9. $\dfrac{1 - 3i}{1 + 2i} = -1 - i$

Q4

4.1. $\dfrac{(6 + 4i)(3 - i)}{2i} = 3 - 11i$

4.2. $3i(5 - 4i) + (6 + 2i) = 18 + 17i$

4.3. $(2 + 3i)(1 - i) - (5 - 4i) = 0 + 5i = 5i$

4.4. $\dfrac{(5 + 2i) + (4 - i)}{1 + i} = 5 - 4i$

4.5. $\dfrac{(2 + i)^3}{(3 + i) - (1 + i)} = 1 + \dfrac{11}{2}i$

4.6. $\left(\dfrac{6 - 3i}{2(1 - i)}\right)^2 = \dfrac{9}{2} + \dfrac{27}{8}i$

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