

Assignment #8

January 12, 2023

1. Evaluate each of the following expressions and give your answer in the form $a + bi$.

(a) $(2 - 3i) + (-3 - 2i)$

(b) $(-2 - 4i)(4 - 5i)$

(c) $|-5 - 4i|$

(d) $\frac{-3 - i}{1 + 4i}$

2. Solve for z and give your answer in the form $a + bi$.

$$\frac{z + 1 + 3i}{-5 + 2i} = z$$

3. Solve for z and give your answer in the form $a + bi$

$$\bar{z} + z = \overline{5 - 2i} - 17 + i$$

4. Express the value z below in polar form and the value w in the form $a + bi$.

$$z = \frac{5}{\sqrt{2}} - \frac{5}{\sqrt{2}}i$$
$$x = 2e^{\frac{i\pi}{3}}$$

5. Compute the following powers and give your answer in the form $a + bi$.

(a) $\left(\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}i\right)^6$

(b) $(1 - \sqrt{3}i)^{13}$

6. Find all complex numbers z satisfying $z^4 = \frac{-81}{2} + \frac{81\sqrt{3}}{2}i$.

7. Find all complex numbers z such that $z^2 = -8 - 6i$ and give your answer in the form $a + bi$.

8. Find all the complex numbers such that $z^2 = 18i$ and give your answer in the form $a + bi$.

9. Find all the distinct roots (real or complex) of $z^2 - 6z + 18 = 0$. Write the roots as a comma-separated list of values of the form $a + bi$.

10. Find all the distinct roots (real or complex) of $z^2 - iz + (-4 + 28i)$.