Liceo Scientifico Statale M.Grigoletti, Pordenone
Modulo CLIL sui Numeri Complessi
Final Exercises - Lesson 10

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1. Simplify the following expressions with complex numbers.

   (a) $\frac{3i^{10}}{(2-i^{21})^2} + \frac{\sqrt{2}i}{(3-i)^2}$

   (b) $(2+3i)(2-3i) - (3+i)^2 + i(3-2i) - 6(i+2)$

   (c) $6i^{12} + \frac{i^{15}+1}{3-i^{13}} - 7i - \frac{4-21}{i^{21}} + (2-3i)i^7 - \frac{2-i}{5}$

2. Find the polar form of the following numbers.

   (a) $\sqrt{3} - i$

   (b) π

   (c) $-3i$

   (d) $\sqrt{2} + i\sqrt{2}$

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

3. Calculate the following numbers, using both the polar and the standard form.

   (a) $\frac{1}{-1+\sqrt{3}i}$

   (b) $\frac{1}{\frac{\sqrt{3}}{4} - \frac{3}{4}i}$

   (c) $\left(\sqrt{3}+i\right)^4$

   (d) $\left(-2 - 2\sqrt{3}i\right)^3$

4. Calculate the following roots of complex numbers.

   (a) $\sqrt[6]{1}$

   (b) $\sqrt[8]{1}$

   (c) $\sqrt[3]{\sqrt{3}-i}$

   (d) $\sqrt[3]{\left(\frac{1-i}{1+i}\right)^3}$

   (e) $\sqrt{\frac{1-i}{1+i}}$

5. Solve the following equations (in most cases you must only find the polar form of the solutions).

   (a) $z^2 - 2iz + 3 = 0$

   (b) $z^2 - 6z + 13 = 0$

   (c) $z^4 + 6z^2 + 25 = 0$