

Birzeit University
Department of Physics
Mathematical Physics, Phys330
Fall 2020
Homework 1: Due date Sep. 26th 2020

1. For complex numbers Prove the following relations:

(a) the cancelation relation is given by:

$$\frac{z_1 z}{z_2 z} = \frac{z_1}{z_2}$$

Given that $z_2 \neq 0$ and $z \neq 0$

(b) z is real if and only if $z = z^*$

2. Write the following number in the exponential form:

(a) $z = \frac{i}{-2-2i}$

(b) $z = (1 + i)^{15}$

(c) $z = (\sqrt{3} - i)^6$

3. Establish the identity:

$$1 + z + z^2 + \dots + z^n = \frac{1 - z^{n+1}}{1 - z} \quad z \neq 1$$

and use it to prove the following identity

$$1 + \cos(\theta) + \cos(2\theta) + \dots + \cos(n\theta) = \frac{1}{2} + \frac{\sin[(2n+1)\theta/2]}{2\sin(\theta/2)}$$

4. Find the square roots of $2i$ and $1 - \sqrt{3}i$

5. Solve the following problems from the book: 20(page 71), 23(page 74)