

MATH 424 / 524

HOMEWORK 1

1) Express the following complex numbers in the form $a + ib$

a) $(2 + 3i)(4 + i)$ b) $(8 + bi)^2$ c) $(1 + \frac{3}{1+i})^2$

2) Find the real and imaginary parts of the following, when $z = x + iy$

a) $\frac{z+1}{2z-5}$ b) z^3 c) $\frac{1}{z^2}$

3. Prove that $|\sum_{k=1}^n z_k| \leq \sum_{k=1}^n |z_k|$.

4. Show that the triangle inequality is an equality for nonzero numbers:

z_1 , and z_2 if and only if $\arg z_1 = \arg z_2$.

5. Find the absolute value, argument, and polar representation of the given complex numbers:

a) $-i$

b) $-3 + 4i$

c) $2 - i$

6. Use De Moivre's theorem to express each number in the form $x + iy$, where x and y are real:

a) $(1 + i)^{29}$

b) $(-1 - i)^{36}$

c) $(\sqrt{3} + i)^{15}$