

Math 1410 Assignment #1

University of Lethbridge, Spring 2017

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Due date: Thursday, January 26th, by 4 pm.

Please review the **Guidelines for preparing your assignments** before submitting your work. You can find these guidelines, along with the required cover page, in the Assignments section on our Moodle site.

Assigned problems

1. Prove the *distributive property* for complex arithmetic. That is, prove that for any complex numbers u, v, w , we have

$$u(v + w) = uv + uw.$$

Reminder: The phrase “for any” tells you that simply providing an example is not acceptable. You need to give a general argument that does not depend on any particular choices of values for your complex numbers.

2. Recall that the complex conjugate of $z \in \mathbb{C}$ is denoted by \bar{z} , and the modulus of z is denoted by $|z|$. Show that:

(a) $|\bar{z}| = |z|$

(b) $|z| = \sqrt{z\bar{z}}$

(c) $\operatorname{Re}(z) = \frac{z + \bar{z}}{2}$ and $\operatorname{Im}(z) = \frac{z - \bar{z}}{2i}$, where $\operatorname{Re}(z)$ and $\operatorname{Im}(z)$ denote the real and imaginary parts of z , respectively.

3. Convert $z = -1 + \sqrt{3}i$ to polar form, and compute the value of $z^6 = (-1 + \sqrt{3}i)^6$. Express your answer in rectangular form.
4. Let $\vec{v} = \langle 3, -1, 4 \rangle$ and $\vec{w} = \langle -2, 5, 1 \rangle$ be two vectors in \mathbb{R}^3 . Find the coordinates of:
 - (a) The point P , one half of the way from the tip of \vec{v} to the tip of \vec{w} .
 - (b) The point Q , one third of the way from the tip of $\vec{v} + \vec{w}$ to the tip of $\vec{v} - \vec{w}$.

(Assume all vectors are drawn with their tails at the origin.)