

# Problem Set 1A: Assignment 1

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MAT 342 – Applied Complex Analysis  
Summer Session II 2019

**DUE: July 18th, 2019**

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**Exercise 0.** Review everything you've studied this week before proceeding!

**Exercise 1.** Express the following in the form  $x + iy$ .

(a)  $\frac{a + ib}{a - ib} - \frac{a - ib}{a + ib}$ . ( $a$  and  $b$  are real numbers.)

(b)  $\frac{\sqrt{1 + a^2} + ia}{a - i\sqrt{1 + a^2}}$ . ( $a$  is a real number.)

**Exercise 2.** Let  $z_1 = x_1 + iay_1$  and  $z_2 = x_2 - i\frac{b}{y_1}$  where  $x_1, y_1, x_2, a$  and  $b$  are real numbers and  $y_1 \neq 0$ . Determine a condition on  $y_1$  so that  $z_1^{-1} + z_2^{-1}$  is real.

**Exercise 3.** Compute the possible square roots of  $\frac{1 - i\sqrt{3}}{2}$  and  $1 + i\sqrt{3}$ .

**Exercise 4.** Find all the possible solutions of  $z^{1-i} = 4$ .

**Exercise 5.** Find all the possible values of  $\sin^{-1}(1/2)$  using the complex sine function.