

**HOMEWORK 3**

DUE 28 JANUARY 2015

**SHOW ALL YOUR WORK.**

1. For each of the following gaussian integers, determine if  $\alpha \mid \beta$ . Justify your answer.

(a)  $\alpha = 2, \beta = 3 + i$ ;

(b)  $\alpha = 1 + i, \beta = 3 + i$ ;

(c)  $\alpha = 1 + i, \beta = 1599 + 2478i$ ;

(d)  $\alpha = 3 + 4i, \beta = 3 - 4i$ ;

(e)  $\alpha = 1 + 4i, \beta = 3 - 14i$ .

2. Determine if  $1 - 2i$  and  $2 + 3i$  are prime elements of  $\mathbb{Z}[i]$ . Justify your answer.

3. Find the quotient of the remainder of the division of  $\beta$  by  $\alpha$  for the following pairs of gaussian integers.

(a)  $\alpha = 2, \beta = 3 + i$ ;

(b)  $\alpha = 2, \beta = 3 + 3i$ ;

(c)  $\alpha = 1 + i, \beta = 1599 + 2478i$ .

4. Find a greatest common divisor for the following pairs of gaussian integers.

(a)  $\alpha = 2, \beta = 3 + i$ ;

(b)  $\alpha = 2, \beta = 3 + 3i$ .