THE UNIVERSITY OF BRITISH COLUMBIA

Math 312 Section 951

Calculators are allowed
No cell phones or information sheets
Test begins at 10:00 am and ends at 10:50am

TEST #2 July 19, 2023

NAME

STUDENT NUMBER

1.(a) Let a, b and c be integers. Prove that (a+cb,b) = (a,b) for (a,b) the greatest common divisor of a and b.

1.(b) Show that if n is a positive integer, then $(n+1, n^2-n+1) = 1$ or 3.

2. (a) Use the Euclidean algorithm to find the GCD of 1001 and 289.

2. (b) Express this GCD as a linear combination of 1001 and 289.

3 Use Fermat factorization to factor

(a) 99400891

(b) 6411023

4. For each of the following diophantine equations find all the integer solutions or show that none exists.

(a) $30x + 47y = -11$

(b) $25x + 95y = 970$

5. Show that $(35)^{1/2}$ is irrational.