4. (20 points) True or false: print a T or an F on each line! Let G be a finite group and let k be a field. Also, 163 and 89 are indeed prime numbers.

(a) F Any subgroup of a non-abelian group is non-abelian

(b) T Any subgroup of an abelian group is abelian

(c) T [3] is a zero-divisor in $\mathbb{Z}/6\mathbb{Z}$

(d) F It's possible for a primitive 10^{th} root of unity in k to be a 5^{th} root of unity in k.

(e) T It's possible for a 10^{th} root of unity in k to be a primitive 5^{th} root of unity in k.

(f) F $\mathbb{Z}/9\mathbb{Z}$ is a field under the usual addition and multiplication operations.

(g) F It's possible for a group of order 10 to have a subgroup of order 3

(h) T It's possible for a group of order 10 to have a subgroup of order 5

(i) F -1 is a square modulo 163

$163 \equiv 3 \mod 4$

(j) T 2 is a square modulo 89

$89 \equiv 1 \mod 8$