Math 31: Abstract Algebra
Fall 2018 - Quiz 3

Date: 11/13/18

Test your knowledge

True false questions *(2 points each)*

1. If A is a ring and $I \lhd A$ and $J \lhd A$ are ideals then $I \cap J$ is an ideal. ◯ True ◯ False

2. If A is a ring with n elements and $B \leq A$ a subring. Then $\#B$ divides n. ◯ True ◯ False

3. In $\mathbb{Z}_5 \times \mathbb{Z}_5$ the set $B = \{(2n, 2n), n \in \mathbb{Z}_5\}$ is a subring. ◯ True ◯ False

4. In $\mathbb{Z}_5 \times \mathbb{Z}_5$ the set $B = \{(2n, 2n), n \in \mathbb{Z}_5\}$ is an ideal. ◯ True ◯ False

5. If $(A, +, \cdot)$ is a commutative ring. Then the cyclic subgroup $\langle x \rangle$ of $(A, +)$ is equal to the principal ideal $Ax = (x)$ generated by x. ◯ True ◯ False

6. If $(A, +, \cdot)$ is a commutative ring and $b \in A$ a divisor of zero. Then $n \bullet b$ is either zero or a divisor of zero. ◯ True ◯ False

7. Let $\alpha : (\mathcal{F}(\mathbb{R}), +, \cdot) \to (\mathbb{R}, +, \cdot)$ be the map defined by $\alpha(f) := f(3) - f(0)$. Then α is a ring homomorphism. ◯ True ◯ False

8. Let $f : A \to B$ be a ring homomorphism. Then f is injective if and only if $\ker(f) = \{0\}$. ◯ True ◯ False

9. If n is not a prime then $(\mathbb{Z}_n, +_n, \cdot_n)$ is not an integral domain. ◯ True ◯ False

10. If $(A, +, \cdot)$ is an integral domain with $char(A) = p$, where p prime. Then A has p elements. ◯ True ◯ False