

FALL 2019: MATH 558 QUIZ 4 SOLUTIONS

Each question is worth 5 points.

1. Carefully state the division algorithm for the set of polynomials $F[x]$ with coefficients in $F = \mathbb{Q}, \mathbb{R}$, or \mathbb{C} .

Solution. Division Algorithm for $F[x]$: Let $f(x), g(x)$ be non-zero polynomials in $F[x]$. Then there exist unique polynomials $q(x), r(x)$ in $F[x]$ such that:

- (i) $g(x) = f(x) \cdot q(x) + r(x)$.
- (ii) $\deg(r(x)) < \deg(f(x))$.

2. Mark each statement as True or False:

- (a) Every prime number is an odd number. **False, 2 is a prime number.**
- (b) If a set of integers is bounded below, then it has a least element. **True**
- (c) For integers, a, b, c , with $a > 0$, if $a|bc$, then $a|b$ or $a|c$. **False. $6|4 \cdot 9$, but 6 divides neither 4 nor 9.**
- (d) Every non-zero real number has a multiplicative inverse. **True**
- (e) Multiplication of polynomials is associative. **True**