CU Boulder

Math 4140

Test 2

Section 003 (Instructor Farid Aliniaeifard)

Friday, Mar. 23, 2018, 9:00 - 9:50 am

NAME (print):______________________________
(Family) (Given)

SIGNATURE:______________________________

STUDENT NUMBER:______________________________

Instructions:

1. Time allowed: 50 minutes.
2. NO CALCULATORS OR OTHER AIDS
3. There are 4 questions on 4 pages. Last page is blank.
4. Questions can be solved in more than one way.
5. You are expected to write clearly and carefully.

Question	**Points**	**Marks**
1	5	
2	5	
3	5	
4	5	
Total	20	

1. (5 points) Let $p(x)$ be an irreducible polynomial in $F[x]$. Show that $p(x)$ is separable if and only if $p^{'}(x) \neq 0$.

2. (5 points) If u is algebraic over F and $K = F(u)$ is a normal extension of F, show that K is a splitting field over F of the minimal polynomial of u.

3. (5 points) If $u \in K$ is algebraic over F and $c \in F$, prove that $u + 1$ and cu are algebraic over F.

4. (5 points) Let $f(x)$ and $g(x)$ be irreducible polynomials in $F[x]$ of degrees m and n, respectively, where $(m, n) = 1$. Show that if u is a root of $f(x)$ in some field extension of F, then $g(x)$ is irreducible in $F(u)[x]$.

The end. Have a great weekend