Due Date: 29 March 2012, Thursday NAME:..

Ali Sinan Sertöz STUDENT NO:..

Math 431 Algebraic Geometry – Homework

previous	7	8	9	10	TOTAL
60	10	10	10	10	100

Please do not write anything inside the above boxes!

Q-7) Let $\phi : C \to \mathbb{P}^2$ be defined by $\phi[x : y : z] = [x : z]$ where C is a nonsingular projective curve in the projective plane not containing the point $[0 : 1 : 0]$. Show that if C has degree $d > 1$, then ϕ has at least one ramification point. Show that if $d = 1$, then ϕ has no ramification points and is a homeomorphism.

Answer:

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Q-8) Show that the projective curve D defined by $y^2z = x^3$ has a unique singular point. Show that the map $f : \mathbb{P}^1 \to D$ defined by

$$f[s : t] = [s^2t : s^3 : t^3]$$

is a homeomorphism. Deduce that the degree-genus formula cannot be applied to singular curves in $\mathbb{P}^2$.

Answer:

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Q-9) Let C be a singular irreducible projective cubic curve in $\mathbb{P}^2$. Show that the tangent line to C at a nonsingular point or a line through two distinct nonsingular points of C cannot meet C at a singular point.

Answer:

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Q-10) Show that if p is a point of inflection on a nonsingular cubic curve C in $\mathbb{P}^2$, then there are exactly four tangent lines to C which pass through p.

Answer: