M E T U Department of Mathematics

Group	Math	115 - Analytic Geometry
		Exam I
Code	: Math 115	Last Name :
Acad. Year	: 2014 - 2015	Name :
Semester	Fall	Department :
Date	30.10.2014	Student No. :
Time	17:40	4 QUESTIONS ON 4 PAGES
Duration	: 100 minutes	TOTAL 50 POINTS
1 2	3 4	

Explain what you are doing briefly. Otherwise you will get no credits!

(10 points) Let P be a point in the plane with a pair of polar coordinates (2, π/6).
(a) Find the Cartesian coordinates (x, y) of P.

(b) Find a polar equation for the line ℓ through $(2, \pi/6)$ perpendicular to the polar axis.

(c) Find a polar equation for the line m through P and the pole O.

- **2.** (14 points) In a given triangle $\triangle ABC$, A(1,8), B(2,1) and C(3,3/2).
- (a) Find an equation of the line ℓ containing the altitude \overline{AD} .

(b) Find the point(s) on the line m containing the side \overline{BC} such that |CE| = 2|BC|.

(c) Find the point D and its distance from B and C.

3. (12 points) Consider the line ℓ with equation x + 2y + 7 = 0.

(a) Find a translation that translates the XY-coordinates (x, y) into a suitable $\tilde{X}\tilde{Y}$ coordinates (\tilde{x}, \tilde{y}) such that ℓ passes through the origin \tilde{O} in the new system.

(b) Rotate the **XY-coordinate system** through an angle of 45° in the **clockwise direction** to obtain $\overline{X} \overline{Y}$ -coordinate system. Write this rotation.

(c) Use (b) to express the equation of ℓ in terms of \bar{x} and \bar{y} .

4. (14 points) Let the points A(-9,3), B(-2,2) and C(2,5) be given.

(a) Determine whether or not the measure of the angle $\angle ABC$ exceeds $\pi/2$. In other words is $\angle ABC$ an obtuse angle?

(b) Find the point D so that the quadrilateral ABCD is a parallelogram.