United Arab Emirates University
Department of Mathematical Sciences
Calculus II (Math 110)
Final Exam
Saturday, January 2^{nd}, 2010
Duration: Two hours

Name: **Student Number**:

Please select your section, put ✓ in the box which corresponds to your section.

Your section	Section	Instructor
	01	Dr. Ahmed Al-Rawashdeh
	101(IT)	Dr. Ahmed Al-Rawashdeh
	51	Dr. Nabila Azzam
	52	Dr. Nabila Azzam
	53	Dr. John Abraham
	54	Dr. Nabila Azzam
	55	Dr.Waleed Emam

Important Instructions:

- **Graphing calculators, books or notes are NOT allowed.**
- **The exam consists of 9 questions, write your answers in the space provided below each one.**
- **The exam is written in 7 pages including this front page.**

Question	#1	#2	#3	#4	#5	#6	#7	#8	#9	Total/35
Mark										

[Question 1] Find the area of the surface obtained by rotating the curve $y = \sqrt{x},\ 0 \leq x \leq 2$ about the x-axis.

[Question 2] Evaluate the integrals $\int \frac{3x^2-6}{x^2-x-2}dx$.

[Question 3] Find the corresponding xy-equation for each of the following polar curves:

(a) $r = 4\sin\theta$

(b) $\theta = \frac{\pi}{3}$

[Question 4] Sketch the Limacon $r = 3 - 6\cos\theta,\ 0 \leq \theta \leq 2\pi$ and then find the area of the inner loop.

[Question 5] Determine whether the improper integral $\int_1^\infty e^{x+x^2}dx$ converges or diverges. Justify your answer.

[Question 6] Find the equation of the tangent line to the curve

$$y(x) = \int_1^{x^2} e^{1-t^2}dt \ , \quad \text{at} \quad x = 1.$$

[Question 7] Let C be the curve which is given by the parametric equations $x(t) = 3\cos t, y(t) = 2\sin t,\ 0 \leq t \leq \frac{3\pi}{2}$.
(a) **Find the slope of the tangent at $t = \frac{\pi}{4}$.**

(b) **Find the point(s) at which the tangent is vertical**.

[Question 8] Suppose that a car A is moving along the curve $C_1 : x = t^2, y = t, 0 \leq t \leq 2$, B is another car moving along the curve $C_2 : x = 2s, y = 2 - 2s,\ 0 \leq s \leq 2$.
(a) **Find the intersection point(s) between the curves C_1 and C_2**

(b) **Determine whether the cars colloide? (means do they reach to a point at the same time)**

[Question 9] Find the volume of the solid obtained by rotating the region bounded by $y = 2 - x, y = x - 2$ and $y = \sqrt{x}$ about $y = -1$.

GOOD LUCK