NAME:

1	/10	2	/10	3	/10	4	/6	5	/8	6	/6	Τ	/50

MATH 251 (Fall 2011) Exam II, Oct 27th

No calculators, books or notes! Show all work and give **complete explanations**. This 65 min exam is worth 50 points.

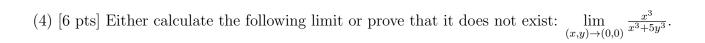
(1) [10 pts] Sketch the level curves (i.e. contours) of $z = f(x, y) = ye^{-x}$ at levels k = -1, 0, and 1.

(2) [10 pts] Consider the curve, C , in the plane parametrized by $(x, y) = \mathbf{r}(t) = (2 \sin t, \cos t)$ for $0 \le t \le 2\pi$.
(a) Find $\mathbf{r}'(\pi/4)$.
(b) Find a parametrization for the tangent line to the curve, C , at $t = \pi/4$.
(c) Sketch the curve, C , and include in your sketch the vectors $\mathbf{r}(\pi/4)$ and $\mathbf{r}'(\pi/4)$.

- (3) [10 pts]
- (a) Let z = f(x, y) be a function with table of values given by

		y						
		4	5	6				
	1	9	11	14				
x	2	4	7	9				
	3	0	6	8				

(b) Calculate the equation of the tangent plane to the graph of the function $f(x,y) = x^2y^3$ at (x,y) = (2,1).



(5) [8 pts] Parametrize that part of the surface $x^2 + y^2 + z^2 = 4$ that lies above the surface $z = x^2 + y^2$.

(6) [6 pts] If $\mathbf{r}(t) \neq \mathbf{0}$, show that

$$\frac{d}{dt}|\mathbf{r}(t)| = \frac{1}{|\mathbf{r}(t)|}\mathbf{r}(t) \cdot \mathbf{r}'(t).$$

Hint: $|\mathbf{r}(t)|^2 = \mathbf{r}(t) \cdot \mathbf{r}(t)$.

Pledge: I have neither given nor received aid on this exam

Signature: