MA227-6D,   CALCULUS III

October 24, 2012

Name (Print last name first): ....

 Student Signature: ....

TEST II

Each question is worth 10 points. Show all of your work for full credit.

<u>Question 1</u>. Find the partial derivatives f_{xx}, f_{xyy} if $f(x,y) = x\cos(y) + xy$.

Answer: ....

<u>Question 2</u>. Find the following limit if it exists, or show it does not exist

$$\lim_{(x,y)\to(0,0)} \frac{x^2 - 2y^2}{x^2 + y^2}.$$

Answer: ....

Question 3. Let $f(x, y, z) = xe^y - \sin(xz) + yz^2$ and $x = s\cos t, y = s\sin t, z = s + t$. Find f_s, f_t (Do NOT simplify).

Answer: ....

Question 4. Use differentials to estimate the amount of tin in a closed can with radius 5 in and height 10 in if the can is 0.04 in thick.

Answer: ....

Question 5. Use implicit differentiation to find z_x, z_y if $xyz = \ln(x + y + z)$ (Do NOT simplify).

Answer: ....

Question 6. Find maximum rate of change of the function $f(x, y, z) = xe^y - \sin(xz) + yz^2$ at $(0, 0, 1)$ and the direction in which it occurs.

Answer: ....

Question 7. Find an equation of the tangent plane of the surface $z+1 = xe^y \cos(z)$ at $(1,0,0)$.

Answer: ....

Question 8. Find the local maximum and minimum values and saddle point(s) of $f(x,y) = x^4 + y^4 - 4xy$.

Answer: ....

Question 9. Find the absolute maximum and minimum values of $f(x, y) = x^2 + y^2 - 4xy + 1$ in the disk $x^2 + y^2 \leq 4$.

Answer: ....

Question 10. Find the dimensions of the (closed) rectangular box with largest volume if the total surface area is 96 cm^2.

Answer: ....