NAME____

I____II____III____IV____V____VI____VII____VIII____IX____X____TOTAL _________

November 4 2005 | Mathematics 206a Multivariable Calculus Examination #2 | Mr. Haines

(10) I. Suppose $\mathbf{f}(x, y, z) = (x + e^z + y, yx^2)$ and **a** = (1, 1, 0). Calculate the total derivative of **f** at **a** .

(10) II. Given that $\mathbf{g}(x, y) = (x^2 + 1, y^2)$ and $\mathbf{f}(u, v) = (u + v, u, v^2)$ use the chain rule to compute the derivative of $\mathbf{f} \circ \mathbf{g}$ at the point (x, y) = (1, 1).

(10) III. Let $f(x, y, z) = x^2 e^{-yz}$. Compute the rate of change of f in the direction of the vector (1, 1, 1) at the point (1, 0, 0).

(10) IV. Give the first and second order Taylor polynomials at **a** = (0, 0) for the function with rule $f(x, y) = e^x \cos y$.

(10) V. Locate any relative maxima, relative minima, or saddle points of the function with rule $f(x, y) = \ln(x^2 + y^2 + 1)$.

(10) VI. Suppose C is a curve in $\Re^4$ parametrized by $\mathbf{c}(t) = (\cos t, \sin t, \cos 2t, \sin 2t)$ with $0 \le t \le \pi$. Compute the length of C .

(10) VII. Suppose C is a helical curve in $\Re^3$ parametrized by $\mathbf{c}(t) = (\sin t, \cos t, t)$ with $0 \le t \le 2\pi$.

Evaluate the line integral $\int_C \mathbf{F} \bullet d\mathbf{x}$ if $\mathbf{F}(x, y, z) = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$.

(10) VIII. Evaluate the iterated integral:

$$\int_0^1 \int_1^{2-y} (x+y)^2 \, dxdy$$

(10) IX. Reverse the order of integration on the iterated integral:

$$\int_0^1 \int_1^{2-y} (x+y)^2 \, dx dy$$

(10) X. Integrate $f(x,y,z) = e^{x+y+z}$ over the box $[0,1]\times[0,1]\times[0,1]$.