NOTE: In no sense should this collection of problems be construed as representative of the actual exam. These are simply some problems left over from our preparation of the exam or from previous exams which should serve to indicate the general level of expectation.

Also note: These are going up in a hurry. Hopefully no typos. Solutions soon!

1. Evaluate the double integral $\iint_D xy^2\,dA$ if D is the region in the half-plane $x \geq 0$ bounded by the curves $x = 1 - y^2$ and $x^2 + y^2 = 1$.

2. Let E be the region in the first octant bounded by the surfaces $2y^2 + z^2 = 8$ and $x + y = 2$ and let f be a continuous function whose domain includes E. Denote by $I = \iiint_E f dV$.

   (a) Set up an iterated integral equal to I of the form $\iiint f\,dz\,dx\,dy$

   (b) Set up an iterated integral equal to I of the form $\iiint f\,dx\,dy\,dz$

3. Find and classify all critical points of the function $f(x, y) = 5x^2y - 2xy^2 + 30xy - 3$.

4. Sketch the region of integration and evaluate the integral $\int_0^2 \int_{2y}^4 \sin(x^2)\,dx\,dy$ by changing the order of integration.

5. Integrate $\iint_D y^2\,dA$ where D is the region bounded by $x^2 + y^2 = 4$ and $y \geq 0$.

6. Consider the triple iterated integral $\int_0^3 \int_{2z/3}^2 \int_0^{4-y^2} y\,dx\,dy\,dz$. Rewrite this integral as $\iiint y\,dz\,dx\,dy$.