Calculus III—Math 225

SAMPLE EXAM 3

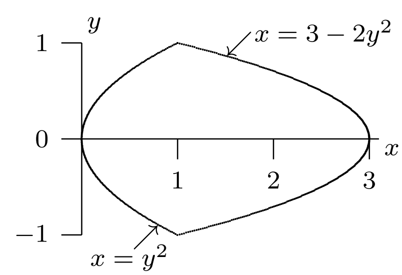
1. Compute: $\iint\limits_R xe^{xy}\,dA$, where R is the square with corners $(0,0)$, $(0,1)$, $(1,1)$, and $(1,0)$.

2. Compute: $\iint\limits_R 1/x\,dA$, $R = \{(x,y) \mid 1 \le y \le e, y^2 \le x \le y^4\}$.

3. Compute: $\int_0^1 \int_y^1 \sin(x^2)\,dx\,dy$.

4. Find the volume under $z = x^2 + y^2$ and above the rectangle described by $-2 \le x \le 2$, $-3 \le y \le 3$.

5. Set up an integral for the surface area of $z = y^2 - x + 3$ above the region shown. Do not evaluate the integral.



6. Find the volume under $z = xy$ and above the region inside $r = 1 + \cos\theta$ in the first quadrant.

7. A flat plate has the shape bounded by the parabola $y = 9 - x^2$ and the x-axis; the density is given by $\sigma(x,y) = x^2y$. Set up the three integrals required to compute the center of mass; do not evaluate the integrals.

8. Compute: $\int_0^2 \int_0^{\sqrt{9-x^2}} \int_0^{x^2} yz\,dy\,dz\,dx$.

9. Compute: $\iiint\limits_R x^3 + xy^2\,dV$, where R is the three dimensional region in the first octant that is under $z = 1 - x^2 - y^2$.

10. Find the mass of a hemisphere of radius 1 if the density is $\sigma(x,y,z) = z$, assuming that the sphere is centered at the origin and the hemisphere is the upper half.