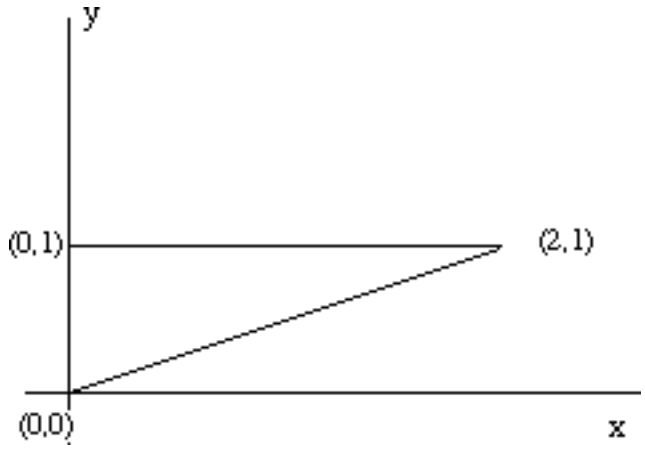
Name_____ 17 April 2000
Teaching Assistant_____ Hour Test III
Math 2401C Andrew

Instructions: 1. Closed book, calculators may be used.
2. Show your work and explain your answers and reasoning.

1. (25) Let $T$ be the triangular domain with vertices at (0,0), (2,1), and (0,1), as shown below.

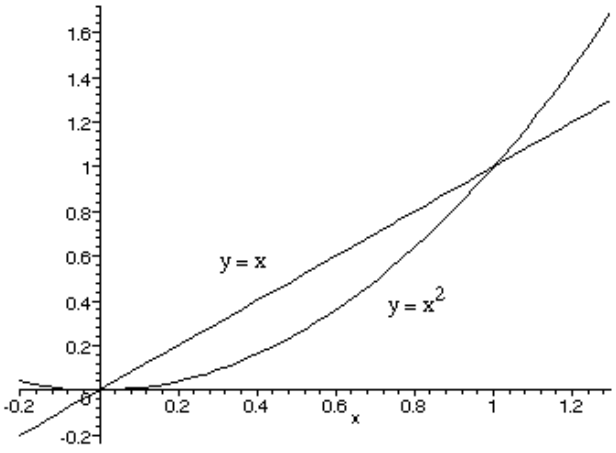



a. Write $\iint_T \sin(y^2)\,dA$ as an interated integral, with ***y* integrated first.**

b. Write $\iint_T \sin(y^2)\,dA$ as an interated integral, with ***x* integrated first.**

c. Evaluate **one** of the integrals obtained in parts *a* and *b*.

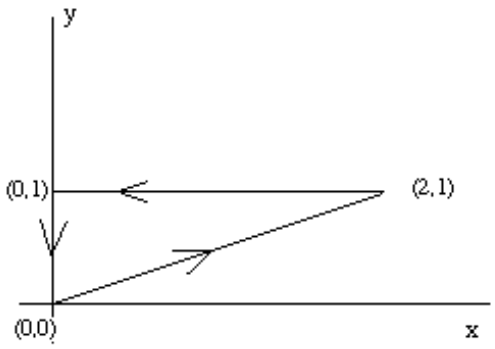
2. (25) A solid lies in the first octant, **below** the paraboloid $z = x^2 + 3y^2$ and **above** the region in the *x*-*y* plane which is sketched below. Calculate the volume of this solid.



3. (25) Use cylindrical coordinates to find the mass of a right circular cone of base radius 3 and height 5, given that the density varies directly with the distance from the base.

4. (25) a. Evaluate $\int_C \mathbf{h}(\mathbf{r}) \cdot \mathbf{dr}$ where $C$ is the straight line from (-1,3) to (1,2), and $\mathbf{h}(x,y) = 2x\,\mathbf{i} + 2y\,\mathbf{j}$.

b. Use Green's Theorem to evaluate $\int_C (2y + x)dx + (4x - y^2)dy$ where $C$ is the triangular path indicated below.




Answers to Test III

1. a. $\int_{x=0}^{2} \left( \int_{y=x/2}^{1} \sin(y^2)\,dy \right) dx$ b. $\int_{y=0}^{1} \left( \int_{x=0}^{2y} \sin(y^2)\,dx \right) dy$ c. Do part b, $1 - \cos(1)$.

2. $11/70$.

3. $\frac{75\pi k}{4}$, $k$ constant of proportionality in density.

4. a. - 5. b. 2