Name: _____

VIP ID: _____

- Write your name and VIP ID in the space provided above.
- The test has five (5) pages, including this one.
- The test is fifty (50) minutes long.
- Enter your answer in the boxes provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

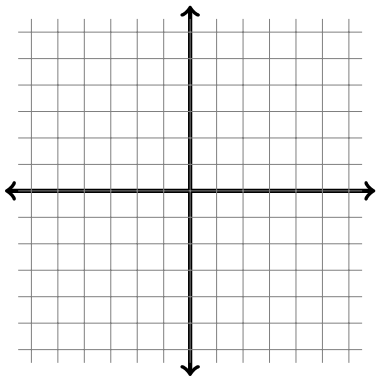
Page	**Max. points**	**Your points**
2	40	
3	20	
4	20	
5	20	
Total	100	

Problem 1 (20 pts—10 pts each)**.** Evaluate the following integrals:

(a) $\displaystyle\int_{\pi/3}^{2\pi/3}\int_{0}^{\cot x} 3\tan x\,dy\,dx =$ $\boxed{}$

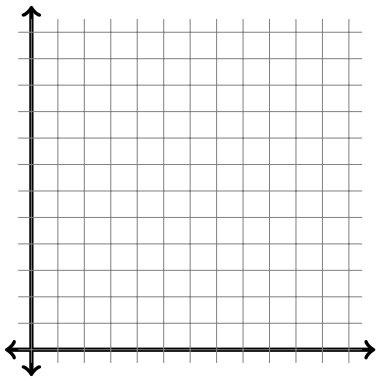
(b) $\displaystyle\int_{0}^{\pi/3}\int_{0}^{\pi/3}\int_{0}^{\pi/3} \cos(x+y+z)\,dx\,dy\,dz =$ $\boxed{}$

Problem 2 (20 pts)**.** Evaluate $\displaystyle\int_R (3x+4y^2)\,dA$, where R is the region in the upper half-plane bounded by the circles $x^2+y^2=1$ and $x^2+y^2=4$. Sketch the region of integration.



$\displaystyle\int_R (3x+4y^2)\,dA =$ $\boxed{}$

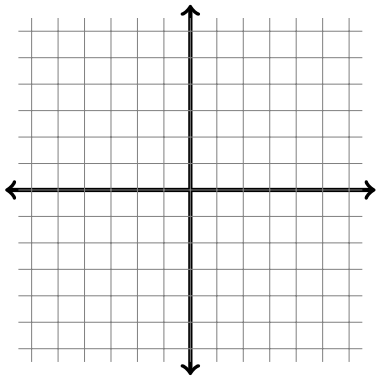
Problem 3 (20 pts)**.** Evaluate the integral $\int_D \sin(y^2)\,dA$ where D is the triangle with vertices $(0,0)$, $(1,1)$ and $(0,1)$. Sketch the domain of integration.
Hint: The order of integration really matters for this problem.



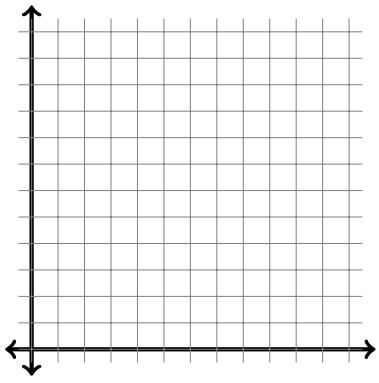
$$\int_D \sin(y^2)\,dA = \boxed{}$$

Problem 4 (20 pts—10 points each)**.** Sketch the domain of integration, and convert the following integrals to polar coordinates. **Do not evaluate.**

(a) $\displaystyle\int_{-5}^{5}\int_{0}^{\sqrt{25-x^2}} 4x^2y^3\,dy\,dx =$



(b) $\displaystyle\int_{0}^{1}\int_{0}^{y} x\,dx\,dy =$



Problem 5 (20 pts)**.** Use a double or a triple integral (your choice!) to compute the volume under the graph of $f(x, y) = xy$ and above the region bounded by $x = y^2$ and $x = y$.

$$V = \iint_D f(x, y)\, dA = \iiint_R dV = \boxed{}$$