Name: ______________________________ **ID Number:** ____________________

TA: ______________________________ **Section Time:** ____________________

MTH 234	***No calculators or any other devices allowed.***
Exam 4: Practice	***If any question is not clear, ask for clarification.***
December 7, 2010	***No credit will be given for illegible solutions.***
50 minutes	***If you present different answers for the same problem,***
Sects: 16.1-16.5,	***the worst answer will be graded.***
16.7, 16.8.	***Show all your work.*** $\boxed{\textit{Box your answers.}}$

1. (20 points) Find the potential function for $\boldsymbol{F} = \left\langle \dfrac{2x}{y}, \dfrac{(1-x^2)}{y^2} \right\rangle$, for $y > 0$.

2. (20 points) Use the Green Theorem in the plane to show that line integral given by $\oint_C \left[xy^2\,dx + (x^2y + 2x)\,dy\right]$ around any square depends only on the area of the square and not on its location in the plane.

3. (20 points) Write an integral which gives the surface area of the surface cut from the hemisphere $x^2 + y^2 + z^2 = 6$, with $z \geqslant 0$ by the cylinder $(x-1)^2 + y^2 = 1$. Your final answer should be written in cylindrical coordinates. Do not evaluate the integral.

4. (20 points) Use the Stokes Theorem to compute the line integral of the vector field $\boldsymbol{F} = \langle x^2y, 1, z \rangle$ along the path C given by the intersection of the cylinder $x^2 + y^2 = 4$ and the hemisphere $x^2 + y^2 + z^2 = 16$, with $z \geqslant 0$, counterclockwise when viewed from above.

5. (20 points) Use the Divergence Theorem to find the outward flux of the field $\boldsymbol{F} = \sqrt{x^2+y^2+z^2}\,\langle x, y, z\rangle$ across the boundary of the region $D = \{1 \leqslant x^2+y^2+z^2 \leqslant 2\}$.

#	Pts	Score
1	20	
2	20	
3	20	
4	20	
5	20	
Σ	100	