Exam # 2 - Practice Problems

Book Practice Problems :

Page 274 : # 13
Page 282 : # 9
Page 293 : # 5, 13
Page 310 : # 3, 9, 14, 19, 25
Page 326 : # 5
Page 353 : # 2, 5, 13
Page 364 : # 17
Page 390 : # 3, 9, 17
Page 404 : # 1, 3
Page 427 : # 3(a), 13
Page 447 : # 1(c)(d), 2(b), 3, 4

1. Let $\vec{\mathbf{c}}(t)$ be a flow line of the gradient field $\vec{\mathbf{F}} = -\nabla V$, show that $\dfrac{d}{dt}V(\vec{\mathbf{c}}(t)) \leq 0$.

2. Evaluate $\displaystyle\int_0^2 \int_{x^2}^4 4x\,\cos(y^2)\,dy\,dx$.

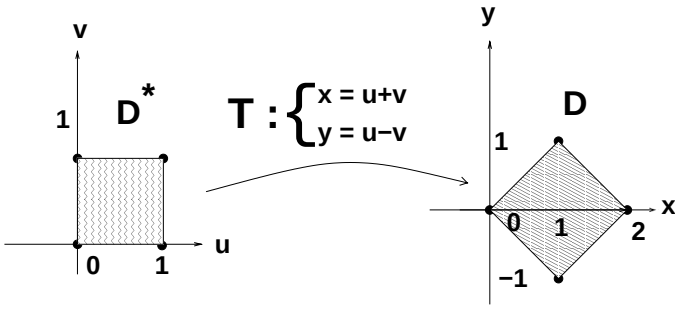
3. Find the total mass of a cone of radius R, height H if it has a constant density $\delta = K$.

4. How much work is done moving a particle along the line segment from $(1,1,2)$ to $(0,3,4)$ subject to a force $\vec{\mathbf{F}}(x,y,z) = 4x\,\vec{\mathbf{i}} + 8yz\,\vec{\mathbf{k}}$?

5. **True or False** ? If $f(x,y,z)$ is any C^2 function, then curl $(\nabla f) = \vec{\mathbf{0}}$.

6. Given that the mapping $T(u,v) = (u+v, u-v)$ maps the region D^* one-to-one and onto the region D, shown below, use the Change of Variables Formula to compute the double integral

$$I = \iint_D 3\left(x^2 - y^2\right)\,dx\,dy\,.$$



7. Compute the path integral $\displaystyle\int_C \frac{(x+y^2+1)}{\sqrt{4y^2+1}}\,ds$, where C is the curve $x = 4 - y^2,\ -1 \leq y \leq 3$.