Calculus II, Fall 2013

Quiz 5

May 30, 2013

Show all details.

1. Evaluate
$$\int_0^1 \int_{y/2}^{y/2+1} y^3(2x-y)e^{(2x-y)^2}\, dx\, dy$$

2. Find the work done by $\boldsymbol{F}(x,y,z) = xy\boldsymbol{i} + yz\boldsymbol{j} + x^2\boldsymbol{k}$ over the line segment joining straightly from $(1,1,1)$ to $(0,0,0)$. Does the answer remain the same if we change it to a different path joining from $(1,1,1)$ to $(0,0,0)$?

3. Is the vector field $\boldsymbol{F}(x,y,z) = (z+y)\boldsymbol{i} + z\boldsymbol{j} + (y+x)\boldsymbol{k}$ conservative? If so, find the potential. If not, explain why.

4. State Green's Theorem for the vector field $\boldsymbol{F}(x,y) = xy\boldsymbol{i} + y^2\boldsymbol{j}$ on the unit disk $\{x^2+y^2<1\}$. You can choose either one of the two forms. Then evaluate the corresponding double integral and line integral and check they are the same.

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