Binghamton University — Spring 2020

Math 323 — Quiz 8

1. Evaluate $\iint_R (x+y)e^{x^2-y^2}\ dA$, where R is the rectangle enclosed by the lines $x-y=0, x-y=2, x+y=0$, and $x+y=3$.

2. Evaluate $\int_C (y+z)\ dx + (x+z)\ dy + (x+y)\ dz$, where C consists of line segments from $(0,0,0)$ to $(1,0,1)$ and from $(1,0,1)$ to $(0,1,2)$.

3. Find a potential function for $\mathbf{F}(x,y,z) = \langle \sin(y), x\cos(y)+\cos(z), -y\sin(z)\rangle$ and use it to evaluate $\int_C \mathbf{F}\cdot d\mathbf{r}$ along C which is given by $\mathbf{r}(t) = \langle \sin(t), t, 2t\rangle$ where $0 \le t \le \pi/2$.

4. A particle starts at the origin, moves along the x-axis to $(5,0)$, then along the quarter-circle $x^2+y^2=25,\ x\ge 0,\ y\ge 0$ to the point $(0,5)$, and then down the y-axis back to the origin. Use Green's Theorem to find the work done on this particle by the force field $\mathbf{F}(x,y) = \left\langle \sin(x), \sin(y) + xy^2 + \frac{1}{3}x^3 \right\rangle$.