MTH 255
Mini Test 3

Damien Adams

(6) 1. Use a change of variables and an appropriate transformation to evaluate $\iint_R xy\, dA$, where R is the square on the origin, $(1,1)$, $(2,0)$, and $(1,-1)$.

(5) 2. Find the gradient field for $f(x,y) = \frac{1}{2}(x^2 - y^2)$. Sketch the gradient field near the origin. Draw enough to give a good idea of how the gradient field will behave.

(7) 3. Let C be the curve given by $\mathbf{r}(t) = \langle t, \cos 2t, \sin 2t\rangle$ with $t \in [0, 2\pi]$. Evaluate $\int_C (x^2 + y^2 + z^2)\, ds$.

(7) 4. Evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle y^2z + 2xz^2, 2xyz, xy^2 + 2x^2z\rangle$, and C is given by $\mathbf{r}(t) = \langle \sqrt{t}, t+1, t^2\rangle$ with $t \in [0, 1]$.