

**Math 2415**  
**Paper Homework #13**

1. Sketch the following vector fields

(a)  $\mathbf{F}(x, y) = 2\mathbf{i} + y^2\mathbf{j}$

(b)  $\mathbf{F}(x, y) = \nabla f$  where  $f(x, y) = 4x^2 + y^2$

2. Evaluate  $\int_C f \, ds$  where  $C$  has parametrization  $\mathbf{r}$  with  $\mathbf{r}(t) = (t^3, t^2, t)$  for  $0 \leq t \leq 1$  and  $f(x, y, z) = 2z + 9yz$ .

3. Evaluate  $\int_C yz \, dy + xy \, dz$  where  $C$  is the curve given by  $x = \sqrt{t}$ ,  $y = t$ ,  $z = t^2$  for  $1 \leq t \leq 2$ .

4. Evaluate  $\int_C [(2x + 3y)\mathbf{i} + (3x + 2y)\mathbf{j} + 3z^2\mathbf{k}] \cdot d\mathbf{r}$  where  $C$  is the line segment from  $(2, -1, 3)$  to  $(4, 2, -1)$ .

5. Let  $C$  be the curve of intersection of the plane  $x + y + 2z = 1$  and the cylinder  $x^2 + y^2 = 1$ . Calculate  $\int_C \mathbf{F} \cdot d\mathbf{r}$ , where  $\mathbf{F} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ .