

## Math 211 Line Integral Practice

1. Find the line integral of  $f(x, y) = y/x$  along the curve  $y = x^2$  for  $1 \leq x \leq 4$ .
2. Find the average value of  $f(x, y, z) = x + y + z$  over the line segment from  $(1, 2, 3)$  to  $(0, -1, 1)$ .
3. Find the work done by the force field  $\mathbf{F}(x, y) = y\hat{\mathbf{i}} - x\hat{\mathbf{j}}$  in moving a particle counterclockwise along the part of the circle  $x^2 + y^2 = 1$  from  $(1, 0)$  to  $(0, 1)$ .

4. Find the potential function  $f(x,y,z)$  for the conservative field  
 $\mathbf{F}(x, y, z) = (e^x \cos (y) + yz)\hat{\mathbf{i}} + (xz - e^x \sin (y))\hat{\mathbf{j}} + (xy + z)\hat{\mathbf{k}}$ .
5. Show that the line integral  $\int_C z^2 dx + 2ydy + 2xzdz$  depends only on the endpoints of the path  $C$  and not on the path taken between those endpoints.
6. Evaluate  $\int_C 2x\cos(y)dx - x^2 \sin(y) dy$  where  $C$  is the parabola  $y = (x - 1)^2$  from  $(1,0)$  to  $(0,1)$ .