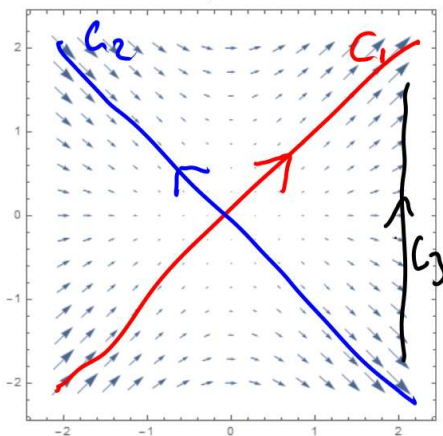


Math 2511 Homework on Fundamental Theorem of Line Integration

1. State the Fundamental Theorem of Line Integration
  
2. Use the above theorem to evaluate the following work integrals
  - a.  $\int_C x^2 + y^2 dx + 2xydy$ , C some curve from (0,0) to (1,2)
  
  - b.  $\int_C \vec{F} \cdot d\vec{r}$ , where  $F(x, y) = \langle e^x \sin(y), e^x \cos(y) \rangle$  and C the curve given by  $r(t) = \langle 1, 2 \rangle + t \langle 4, 3 \rangle, 0 \leq t \leq 1$
  
  - c.  $\int_C (yz + 2x z^3)dx + (xz - z)dy + (xy + 3x^2 z^2 - y)dz$ , C is the straight line from (-1,-2,-3) to (3,2,1)
  
3. Use any method you like to find the following work integrals
  - a.  $\int_C (x^2 + y^3)dx + 3xydy$ , where C is a straight line from (-1,0) to (2,2)
  
  - b.  $\int_C \sin(x) \cos(y) dx + \cos(x) \sin(y) dy$ , where C is the line from (-1,1) to (1,-1) followed by a line from (1,-1) to (2,2)
  
  - c.  $\int_C yzdx + xzdy + xydz$  where C is the closed circle starting and ending at (1,0,0).
  
4. Estimate the signs of the following work integrals:



a)  $\int_{C_1} \vec{F} \cdot d\vec{r}$

b)  $\int_{C_2} \vec{F} \cdot d\vec{r}$

c)  $\int_{C_3} \vec{F} \cdot d\vec{r}$