

## Calc 3 - Assignment 16 (Line Integrals)

① Evaluate the line integrals for the given curve  $C$ :

a)  $\int_C y^3 ds$ ,  $C: x=t^3, y=t, t \in [0, 2]$

b)  $\int_C x \sin(y) ds$ ,  $C$  is the line segment from  $(0, 3)$  to  $(4, 6)$

c)  $\int_C x e^y dx$ ,  $C$  is the curve  $x=e^y$  from  $(1, 0)$  to  $(e, 1)$

d)  $\int_C xy dx + (y-x) dy$ ,  $C$  consists of the line segments from  $(0, 0)$  to  $(2, 0)$  and from  $(2, 0)$  to  $(3, 2)$

e)  $\int_C \sin(x) dx + \cos(y) dy$ ,  $C$  is top-half of the circle  $x^2 + y^2 = 1$  from  $(1, 0)$  to  $(-1, 0)$ .

f)  $\int y dx + z dy + x dz$ ,  $C$  given by  $r(t) = \langle t^2, 2t+1, 4t \rangle$ ,  $t \in [0, 1]$

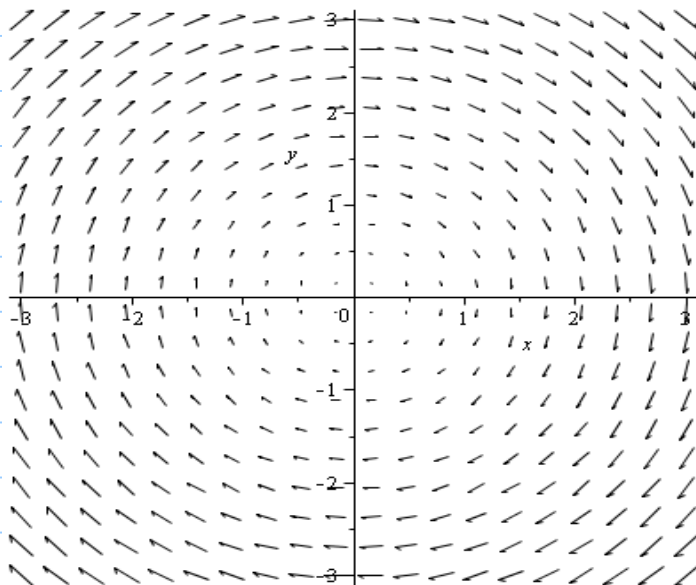
② Evaluate  $\int_C \vec{F} \cdot d\vec{r}$  for the given curve  $r(t)$ .

a)  $\vec{F} = (xy, 3y^2)$ ,  $r(t) = \langle t^2, t^3 \rangle$ ,  $t \in [0, 1]$

b)  $\vec{F} = (x+y, y-z, z^2)$ ,  $r(t) = \langle t^2, t^3, t^2 \rangle$ ,  
 $t \in [0, 1]$

c)  $\vec{F} = (z, y, -x)$ ,  $r(t) = \langle t, \sin(t), \cos(t) \rangle$ ,  
 $t \in [0, \pi]$

③ Let  $\vec{F}$  be the vector field shown in the figure below. Let  $C_1$  be the line segment from  $(-3, -3)$  to  $(-1, 3)$ , and  $C_2$  a circle with radius 3 and center at the origin. Are  $\int_{C_1} \vec{F} \cdot d\vec{r}$  and  $\int_{C_2} \vec{F} \cdot d\vec{r}$  positive, negative, or zero?



The vector  
 field  
 $\langle y, -x \rangle$