

Find the line integral

$$\int_C \mathbf{F} \cdot d\mathbf{r}$$

for

1)

$$\mathbf{F} = (x + 2, 2y + 3), \mathbf{r}(t) = (2t, \cos t), 0 \leq t \leq \pi.$$

($\mathbf{r}(t)$ is the parametrization of the curve C .)

2) $\mathbf{F} = (x^2, y^2 + x)$ and C is the graph of the function $y = x^2, -1 \leq x \leq 1$. Do it in two cases: one is the forward C , the other is the backward C .

3) $\mathbf{F} = (y, -x)$ and C is the circle of radius 2 and center the origin. Do it in two cases: one is clockwise, the other is counterclockwise.

4) $\mathbf{F} = (xy^2, x^2y)$, and C is the straight line from $(1, 2)$ to $(4, 6)$. Do it in two different running directions.