The **line integral of f with respect to x** is,

$$\int_C f(x,y)\,dx = \int_a^b f(x(t),y(t))\,x'(t)\,dt$$

1. Evaluate $\int_C \sin(\pi y)dy + yx^2dx$ where C is the line segment from $(0, 2)$ to $(1, 4)$

2. Evaluate $\int_C ydx + xdy + zdz$ where C is given by $x = \cos t, y = \sin t, z = t^2$, $0 \leq t \leq 2\pi$.