Yash Khangura "Quiz" for Lecture 18 Section 24

1. Let C be the line segment from $(0,1)$ to $(2,3)$, find

$\int_C xy\,ds$ $\quad y=x+1 \quad x=t, \; y=t+1 \quad 0\le t\le 2$

$$\int_0^2 t(t+1)\sqrt{\left(\frac{dx}{dt}\right)^2+\left(\frac{dy}{dt}\right)^2}\,dt = \int_0^2 (t^2+t)\sqrt{2}\,dt = \sqrt{2}\int_0^2 t^2+t\,dt$$

$$\sqrt{2}\left(\frac{t^3}{3}+\frac{t^2}{2}\right)\Big|_0^2 = \frac{14\sqrt{2}}{3}$$

2. Evaluate $\int_C xy^2\,dx + x^2y\,dy$ where C is $x=t^2,\ y=t^3,\ 0\le t\le 1$

$$\int_0^1 t^8\cdot 2t + t^7\cdot 3t^2\,dt = \int_0^1 2t^9+3t^9\,dt = \int_0^1 5t^9\,dt = \frac{t^{10}}{2}\Big|_0^1 = \frac{1}{2}$$