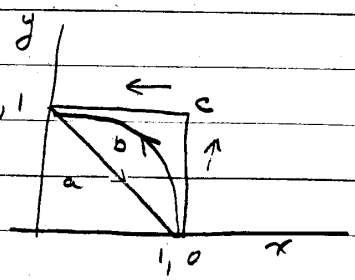
Book 6-8, 6a

$\mathbf{F} = (2xy - 3)\,\mathbf{i} + x^2\,\mathbf{j}$



(a) $a = -1 \qquad b = 1$

$y = 1 - x \qquad dy = -dx$

$$\int \mathbf{F} \cdot d\mathbf{r} = \int (2xy - 3)\,dx + \int x^2\,dy$$

$$= \int_1^0 [2x(1-x) - 3]\,dx + \int_1^0 x^2(-dx)$$

$$= \int_1^0 2x\,dx - \int_1^0 2x^2\,dx - 3\int_1^0 dx - \int_1^0 x^2\,dx$$

$$= x^2\Big|_1^0 - \tfrac{2}{3}x^3\Big|_1^0 - 3x\Big|_1^0 - \tfrac{1}{3}x^3\Big|_1^0$$

$$\int \mathbf{F} \cdot d\mathbf{r} = -1 + \tfrac{2}{3} + 3 + \tfrac{1}{3} = -1 + 1 + 3 = 3$$