Evaluate $f(x,y)$ from origin to $C(2,1)$.

$f(x,y)=x^2+y^2$ $\quad (0,0)-(2,1)$

Line segment from (a,b) to (c,d)

$x=t\cdot c+(1-t)\cdot a$

$y=t\cdot d+(1-t)\cdot b$

$x=2t$ $\quad y=t$ $\quad \frac{dr}{dt}=(2,1)$ $\quad \left|\frac{dr}{dt}\right|=\sqrt{2^2+1^2}=\sqrt{5}$

$$\int_a^b f(r(t))\cdot\left|\frac{dr}{dt}\right|dt$$

$$=\int_0^1 \left((2t)^2+(t)^2\right)\cdot\sqrt{5}\,dt$$

$$=\int_0^1 \left(4t^2+t^2\right)\cdot\sqrt{5}\,dt$$

$$=\left[5\cdot\frac{t^3}{3}\cdot\sqrt{5}\right]_0^1$$

$$=\frac{5\cdot 1^3}{3}\cdot\sqrt{5}-\left(\frac{5\cdot 0^3}{3}\cdot\sqrt{5}\right)$$

$$=\underline{\underline{\frac{5\sqrt{5}}{3}}}$$