1. $F(x,y,z) = (yz+2y+3z)i + (xz+2x+4z)j + (xy+3x+4y)k$

$x+y+z=1$, $x^2+y^2=1$

$x = \cos t$, $y = \sin t$

$r(t) = \cos t\, i + \sin t\, j + 0k$, $0 \le t \le 2\pi$

$F(x,y,z) = (2\sin t)i + (2\cos t)j + (3\cos t + 4\sin t)k$

$dr(t) = (\begin{matrix} \cancel{-\cos t} \\ -\sin t \end{matrix} i + \cos t\, j + 0k)\, dt$

$F \cdot dr = -2\sin^2 t + 2\cos^2 t$

$$\int_0^{2\pi} -2\sin^2 t + 2\cos^2 t \; dt$$

$= \sin(2t)\Big|_0^{2\pi}$

$= 0$