(15) $\int_C z^2\,dx + x^2\,dy + y^2\,dz$ $(1,0,0)$ $(4,1,2)$

$r(t) = (1-t)\langle 1,0,0\rangle + t\langle 4,1,2\rangle \quad t \in [0,1]$

$r(t) = \langle 1+3t, t, 2t\rangle$

$dt(r'(t)) = \langle 3,1,2\rangle dt$

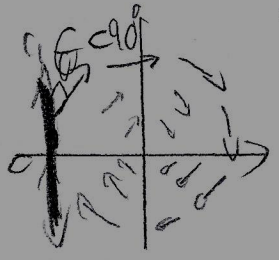
$$\int_0^1 4t^2(3dt) + (1+3t)^2 dt + 2t^2\,dt = \int_0^1 23t^2+6t+1\,dt$$

$$= \left[\frac{23}{3}t^3 + 3t^2 + t\right]_0^1 = \boxed{\frac{35}{3}}$$

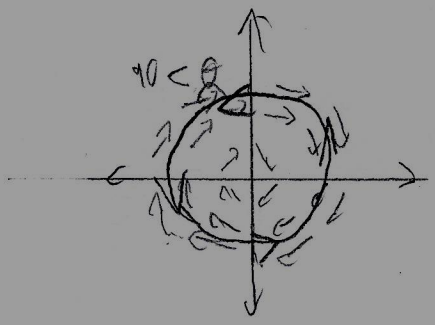
(17) a.) $\int_{C_1} F\,dr = \int_{C_1} F\,T\,dt \int_{C_1} |F|\,|T| \cos\theta\,dt$ θ is angle between tangent and vec field.

$\cos\theta$ is positive when θ is acute and negative when θ is obtuse. At all points on C_1 θ is acute therefore $\int_{C_1} F\,dr$ is always

positive



b.) $\cos\theta$ is negative when θ is obtuse. At all points on the tangent θ is obtuse, therefore line integral is negative on C_2.



negative on C_2