2000 Exam 3

① $\int_C kz\,dx = k\int_0^{\pi} 4t\sqrt{\left(\frac{dx}{dt}\right)^2+\left(\frac{dy}{dt}\right)^2+\left(\frac{dz}{dt}\right)^2}\,dt = k\int_0^{\pi} 4t\sqrt{9\sin^2t+9\cos^2t+16}\,dt$

$= k\,20\frac{t^2}{2}\Big]_0^{\pi} = (10k\pi^2)$

② $\int_0^1 \left((t^4-t^6)2t + 2t^2t^3\,3t^2\right)dt = \int_0^1 2t^5-2t^7+6t^7\,dt = \int_0^1 2t^5+4t^7\,dt$

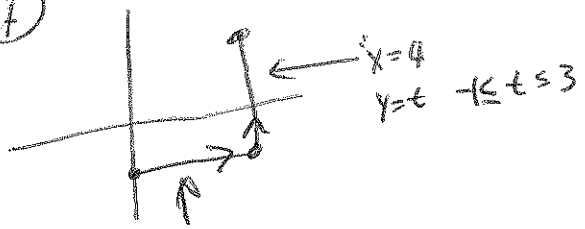
$= \frac{t^6}{3}+\frac{t^8}{2}\Big]_0^1 = \left(\frac{1}{3}+\frac{1}{2}\right)$

③ $\int_C \vec{F}\cdot d\vec{r} = \int_{-1}^{0}\left((x^3-y^3)\frac{dx}{dt}+xy^2\frac{dy}{dt}\right)dt = \int_{-1}^{0}\left(t^6-t^9)2t + t^2t^6\,3t^2\right)dt$

$= \int_{-1}^{0} 2t^7-2t^{10}+3t^{10}\,dt = \int_{-1}^{0} 2t^7+t^{10}\,dt = \frac{t^8}{4}+\frac{t^{11}}{11}\Big]_{-1}^{0}$

$= -\frac{1}{4}+\frac{1}{11} = \frac{-11+4}{44} = \left(\frac{-7}{44}\right)$

④




x=t 0≤t≤4

$\int_0^4 -1\,dt + \int_{-1}^{3} 16\,dt = (-1)4+16(4) = (60)$

⑤ $\int_C \vec{F}\cdot d\vec{r} = \frac{k}{\sqrt{x^2+y^2+z^2}}\Big]_{(0,3,0)}^{(4,3,0)} = \frac{k}{\sqrt{16+9}}-\frac{k}{\sqrt{9}} = \left(\frac{k}{5}-\frac{k}{3}\right)$