$\Rightarrow W_1 = x^2 + x^3$
$W_2 = x^1 + x^3$
$W_3 = x^1 + x^2$
$\Rightarrow W = (x^2+x^3)\partial_1 + (x^1+x^3)\partial_2 + (x^1+x^2)\partial_3$

$d\omega = 0 \Rightarrow \omega$ is closed
and $d L_W \Omega = W \lrcorner d\Omega + d(W \lrcorner \Omega)$
$= d(W \lrcorner \Omega) = d\omega = 0$
W is a vector field whose flow preserves Ω ie flow of vector field W is volume preserving (2)

5) i) Th each of i), ii), iii) take $\alpha = f\theta^1 \wedge \dots \theta^p$
$\beta = g\theta^{p+1} \wedge \dots \theta^{p+k}$ see opp

a) $D(\alpha \wedge \beta) = d(fg\theta^1 \wedge \dots \theta^p \wedge \theta^{p+1} \wedge \dots \theta^{p+k})$
$= (df)g + f(dg)(\theta^1 \wedge \dots \theta^p \wedge \theta^{p+1} \wedge \dots \theta^{p+k})$
$= df \wedge \theta^1 \wedge \dots \theta^p \wedge g\theta^{p+1} \wedge \dots \theta^{p+k}$
$+ (-1)^p f\theta^1 \wedge \dots \theta^p \wedge dg \wedge \theta^{p+1} \wedge \dots \wedge \theta^{p+k}$
$= (d\alpha) \wedge \beta + (-1)^p \alpha \wedge d\beta$
$D = d$ is an anti-derivation of degree 1. (2)

b) $D(\alpha \wedge \beta) = L_V(fg \wedge \theta^1 \wedge \dots \wedge \theta^p \wedge \theta^{p+1} \wedge \dots \theta^{p+k})$
$= V(fg)\theta^1 \wedge \dots \theta^p \wedge \theta^{p+1} \wedge \dots \wedge \theta^{p+k}$
$+ fg(\sum_{r=1} \theta^1 \wedge \dots dV^r \wedge \dots \theta^p) \wedge \theta^{p+1} \wedge \dots \theta^{p+k}$
$+ fg\,\theta^1 \wedge \dots \theta^p \wedge (\sum_{r=p} \theta^{p+1} \wedge \dots \theta^{r-1} \wedge dV^r \wedge \theta^{r+1} \wedge \dots \theta^{p+k})$

$= ((Vf)g + f(Vg))\theta^1 \wedge \dots \theta^{p+k}$
$+ f(\sum \theta^1 \wedge \dots dV^r \dots \theta^p) \wedge g\theta^{p+1} \wedge \dots \theta^{p+k}$
$+ f\theta^1 \wedge \dots \theta^p \wedge g(\sum \theta^{p+1} \wedge \dots dV^r \wedge \dots \theta^{p+k})$

$= (Vf)\theta^1 \wedge \dots \theta^p \wedge g\theta^{p+1} \wedge \dots \theta^{p+k}$
$+ f\theta^1 \wedge \dots \theta^p \wedge (Vg)\theta^{p+1} \wedge \dots \wedge \theta^{p+k}$
$+ f L_V(\theta^1 \wedge \dots \theta^p) \wedge \beta$
$+ \alpha \wedge g L_V(\theta^{p+1} \wedge \dots \theta^{p+k})$