Prove: (Prop 1.45 Warner)
If $X$, $Y$, and $Z$ are smooth vector fields on $M$ then:

a) $[X, Y]$ is a smooth vector field on $M$.

b) For smooth functions $f$ and $g$ we have

$$[fX, gY] = fg[X, Y] + f(Xg)Y - g(Yf)X.$$  

c) $[X, Y] = -[Y, X]$.

d) $[[X, Y], Z] + [[Y, Z], X] + [[Z, X], Y] = 0$ (Jacobi identity)

Problems from Warner page 51:

10, 14, 15, 17, 18