1(a) $\forall\ f=ax+b,\ g=cx+d \in S.$

$f\cdot g = f(g(x)) = f(cx+d) = a(cx+d)+b = acx+ad+b \in S.$

$g\cdot f = g(f(x)) = g(ax+b) = c(ax+b)+d = acx+bc+d \in S$

$\Rightarrow (S,\cdot)$ is closed.

(b) $e = x \in S.$

$\forall\ f=ax+b.\ ,\ f\cdot e = f(e(x)) = f(x) = ax+b$

$e\cdot f = e(f(x)) = f(x) = ax+b$

$\Rightarrow$ e is the identity element of $(S,\cdot)$

(c) let $f=1,\ g=x+1.$

$\Rightarrow \begin{cases} f\cdot g = 1 \\ g\cdot f = 2 \end{cases} \Rightarrow f\cdot g \neq g\cdot f$

So $(S,\cdot)$ is not a group

(d) $S' = \{f \mid f(x)=ax,\ a\neq 0,\ a,x\in R\}$

(1) $\forall\ f=ax,\ g=bx \in S',\quad f\cdot g = f(g(x)) = abx \in S'$

(2) $\forall\ f=ax,\ g=bx,\ h=cx \in S'$

$(f\cdot g)\cdot h = (f\cdot g)(h(x)) = f(g(h(x))) = abcx$

$f\cdot(g\cdot h) = f\cdot g(h(x)) = f(g(h(x))) = abcx = (f\cdot g)\cdot h.$

(3) $e = x,\ \forall\ f=ax \in S'.$

$e\cdot f = e(f(x)) = ax = f(e(x)) = f\cdot e$

(4) $\forall\ f=ax \in S',\ \exists\ \frac{1}{a}\in R,\ s.t.\ f' = \frac{1}{a}x.$

$\Rightarrow f\cdot f' = f(f'(x)) = x = f'(f(x)) = f'\cdot f = e = x.$

So $(S',\cdot)$ is a group.