2) we need to check that:

$1 \le k \le p-1$ and $j \ge 1 \Longrightarrow$

$$\gamma_k(x)\,\gamma_{pj}(x) = \binom{pj+k}{k}\gamma_{k+pj}(x)$$

where $\binom{pj+k}{k}$ is a unit in $Z_{(p)}$.

But $\binom{pj+k}{k} \equiv \binom{pj}{0}\binom{k}{k} = 1 \cdot 1 = 1$

mod p. //

<u>Closing exercises:</u> 1) Localized at a prime p,

$$S^{2n} \cup e^{4n} \cup \cdots \cup e^{2n(p-1)} \hookrightarrow \Omega S^{2n+1} \xrightarrow{h} \Omega S^{2pn+1}$$

is a fibration sequence up to

homotopy equivalence.

2) Show that the Hopf algebra $H(\Omega^2 S^{2n+1}; Z/p)$
is primitively generated for p = odd prime.

Hint: Use the following theorem of Milnor-Moore:
Let B be a connected Hopf algebra over Z/p and suppose B has commutative multiplication. If $\xi(B)$ = the sub Hopf algebra generated by all p-th powers, there is an exact sequence

$$0 \to P(\xi(B)) \to P(B) \to Q(B).$$