$12\frac{1}{3}$

$$n^2+3n+2=n^2+5n+2$$
$$0=2n \Rightarrow n=0$$

But $n \geq 1$ $\therefore$ $n=0$ not possible
$\therefore$ No iterate can begin with either 0.011 or 0.101

Suppose we have a periodic k orbit, so that $b_p = b_{p+k}$, $p=1,2,3\ldots$ The ones occurs at $f(n), f(n+1)\ldots$ The b_is are not all zero (If they are all zero then there are no ones beyond a certain point, but this is a contradiction, since $f(m)>f(n)$ for $m>n$, $f'(n)=n+\frac{3}{2}>0$

$\therefore$ since the set of natural numbers is unbounded above $f(m)$ is unbounded above and there are an infinite no. of 1s.).

The ones are separated by at most $k-1$ zeros. $f(n+r)-f(n)$

$$=\frac{(n+r)^2+3(n+r)-2}{2}-\frac{n^2+3n-2}{2}$$

$$=\frac{n^2+2nr+r^2+3n+3r-2-n^2-3n+2}{2}$$

$$=\frac{2nr+r^2+3r}{2}$$ is least when $r=1$

Put $r=1$, $f(n+1)-f(n)=\frac{2n+4}{2}=n+2$

Since $n\in N$, N unbounded above we can find n such that $n+2>k-1$ and there are no ones in the $[b_p b_{p+1} \ldots b_{p+k}]$ but there are an infinite number of ones $\therefore$ the orbit of ε_0 is not periodic.

Obviously not periodic since no repetition

$2/5$

If the orbit of ε_0 were dense the iterates of ε_0 would pass arbitrarily close to every point in the interval $[0,1]$, but no iterate begins with 0.011 (or 0.11) $\therefore$ no iterates passes arbitrarily close to 1 $\therefore$ the orbit of ε_0 is not dense. The same argument applies