Hw 2.

1. (a) $(g\ 0)$
$= ((\lambda f)(\lambda(x)x))\ second)\ false)$
$= ((\lambda(x)x)\ false)$
$= false.$

(b) $(g\ n)$ when n results from some application succ on 0.
$= ((\lambda f)(\lambda(x)x))\ second)\ false$
$= ((\lambda(x)(\lambda(y)(\lambda(z)y)))\ false)$
Since $(\lambda(y)(\lambda(z)y))$ is the semantics of true then we have $((\lambda(x)\ true)\ false)$.
which is false.
It will always be false because different n will only cause different times second is given one.

(c) The logical operation computed by g is $(=\ n\ 0)$ which is $n = 0$.

2. Proof: $(Y\ t) = \lambda t.(\lambda x.(t(x\ x))\ \lambda x.(t(x\ x))\ t.$
$= (\lambda x.\ t\ (x\ x))\ (\lambda x.(t\ (x\ x))$
$= t\ ((\lambda x.\ t\ (x\ x))\ (\lambda x.(t\ (x\ x))))$
$= t\ (Y\ t)$