6. Claim: #1(vw) = #1(v) + #1(w) proved by structural induction

   Base Cases: v = ϵ and w = ϵ. From identity property of strings we know $\epsilon + \epsilon = \epsilon$ and #1(ϵ) = #1(ϵ) + #1(ϵ) which is the same as 0=0

   v has elements and w = ϵ. From the additive property of strings we know ϵ + v = v which is the same as ϵv and #1(ϵv) is the same as #1(v)

   vise versa w has elements and v = ϵ. From the additive property of strings we know ϵ + w = w which is the same as ϵw which is the same as ϵw and #1(ϵw) is the same as #1(w)

   Inductive hypothesis: v = 1 + ϵ

   From string additive property we know w + 1 + ϵ = 1wϵ

   Therefore a recursively defined function counting ones will treat vw and v + w the same.