Exercise 2.2

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Claim 1. *T(0) = 1, T(1) = 0, T(n) = 2 * T(n-2)*
has the solution $T(n) = 2^{\frac{n}{2}} * (1 - (n\%2))$.

Proof. Proof by induction. Base case: n = 0.
Base case: let n=0, T(0) = $2^{0/2}$*(1-(0%2))=2^0*(1-0) = T(0), and T(0)=1
Second base case: let n=1, T(1)=$2^{\frac{1}{2}}$*)1-(1%2))=$2^{\frac{1}{2}}$*(1-1)=$2^{1/2}$*0=0// Assume that the claim holds for some even n=2*u, T(n)=2^u
IH: show the claim holds for (n+2)=2*(u+1)
T(2*u+2)=2*T(2*u)
= 2 * $2^{2*\frac{u}{2}}$ * (1-((2*u)%2))
= 2 * 2^u *(1-0) = (2*2^u)*1 = 2^{u+1}

∎

Claim 2. *T(0) = 0,T(n) = T(n-1) + n*

Proof. Proof by induction. Base case: n = 0.
T(0) = 0. 1 +...+ 0 = 0. Base case holds
IH: T(n) = 1+2+...+ n. Show claim holds for n+1:
T(n+1) = T(n) + n + 1 = 1 + 2 + ... + n + (n + 1) ∎

Claim 3. *T(0) = 0, T(n) = T(n-1) * n*

Proof. Proof by induction. Base case: n = 0, T(0) = 0.
IH: Assume for some n that T(n) = 0. Show that T(n + 1) = 0.
T(n+1) = T(n) * (n+1) = 0 ∎

Claim 4. *T(1) = 1, T(n) = 2 * T(n/2) (Assume n is a power of 2.)*

Proof. ∎

Claim 5. *T(0) = 1, T(1) = 2, T(n) = 2 * T(n-2)*

Proof. ∎

Claim 6. *T(0) = -1, T(n) =* $(T(n-1)^2$

Proof. ∎