HW#1 Solution, CSCI 323, Spring 2003
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Problem 1 Solution

In both graphs, the functions ordered by growth rate from slow to fast, as $n \to \infty$, are:

$$12n, 6n\log(n), n^2, n^3, 2^n$$

Problem 2 Solution

- Base: $T(1) = 4 \times 1$.
- Induction: Assume $T(n') = 4n'$ for $n' < n$.

  $$T(n) = T(n-1) + 4 = 4(n-1) + 4 = 4n$$

  which is the original claim.

Problem 3 Solution

- Base: $T(1) = 2^1$.
- Induction: Assume $T(n') = 2^{n'}$ for $n' < n$.

  $$T(n) = 2T(n-1) = 2 \cdot 2^{n-1} = 2^n$$

  which is the original claim.

Problem 4 Solution

In the induction step, the proof only works for $n \geq 3$. Thus, the base must include both $n = 1$ and $n = 2$. In the given proof, only base $n = 1$ is verified. Therefore the proof cannot justify that all sheep have the same color.