1. Suppose that f(n) = Θ(g(n)). Assume that both are increasing functions.
2. Must it be true that log f(n) = Θ(log g(n))? Prove or disprove.

True: Use overestimation

A function always outgrows a constant.

1. Must it be true that 2f(n) = Θ(2g(n))? Prove or disprove.

Checking for O(g(n))

Same issue can be applied for Omega(g(n))

1. a) Suppose you have a function of two variables, n and k. What would it mean, mathematically, to say that this function is O(n + k)?

(b) Let f(n) = O(n) and g(n) = O(n). Let c be a positive constant. Prove or disprove that f(n) + c · g(k) = O(n + k)

1. Let f(n) =

Find a simple g(n) such that f(n) = Θ(g(n)), by proving that f(n) = O(g(n)), and that f(n) = Ω(g(n)).

Don’t use induction / substitution, or calculus, or any fancy formulas. Just exaggerate and simplify for big-O, then underestimate and simplify for Ω.

Exaggerate and simplify:

This creates a geometric series

For Ω, underestimate and simplify

Taking half of the summation works for underestimating

Underestimate the geometric series