Formal Def (*c and n0 are fixed positive numbers*):

∀

Formal Def 2:

Example:

Proof: Using Def 2,

Because the limit is 0, we have shown

Formal Def (*c and n0 are fixed positive numbers*):

Example:

Proof:

Using some constant c, and

Divide each side by and simplify:

For and c = 1, holds true.

Formal Def:

Example:

Proof:

Because the limit is , we have shown

Formal Def (*c1, c2 and n0 are fixed positive numbers*):

Example:

Proof: We know the above to be true (using the definition of Big Theta which states:

We can also prove it by the first definition:

Find constants *c1, c2* using f(x) and g(x), where g(x) = x2

Simplify by dividing by

For n0 = 0 and settingx = 1, c2 = 4 and c1 = 1 we see that our definition holds.

a = 8

b = 2

f(n) =

nlog28 = n3

n3 > 3n2. f(n) is asymptotically larger than nlogba so case 1 applies.

a = 3

b = 3

f(n) =

nlog33 = n

is asymptotically larger than n, but not polynomially larger. \*Probably need to take this further. Currently can only say it falls between case 2 & 3.

**U1)** Let and substitute in T(n)

Simplify

Repeat using from **U1** (unwind 1) *.*

**U2)** Begin by letting and substituting into T(n)

Simplify

Pattern

Repeat until (in which T becomes the constant T(1)), which makes

Ignore T(1). It is a constant and we do not care about its value at substantially large values of n.