Worksheet 12 Solution

March 21, 2020

Question 1

a. $c, n_0 \in \mathbb{R}^+$, $\forall n \in \mathbb{N}$, $n \geq n_0 \Rightarrow g(n) \leq c$, where $g : \mathbb{N} \to \mathbb{R}^{\geq 0}$

Question 2

- Let $c = \frac{277}{2}$, $n_0 = 1$, $n \in \mathbb{N}$, $f, g : \mathbb{N} \to \mathbb{R}^{\geq 0}$, $g(n) = 100 + \frac{77}{n+1}$, $f(n) = 1$. Assume $n \geq n_0$

Then,

$$g(n) = 100 + \frac{77}{n+1} \leq 100 + \frac{77}{n+1} \tag{1}$$
$$\leq 100 + \frac{77}{2} \tag{2}$$
$$\leq \frac{277}{2} \tag{3}$$
$$\leq c \cdot 1 \tag{4}$$
$$\leq c f(x) \tag{5}$$

The, it follows from the definition of Big-Oh that the statement $100 + \frac{77}{n+1} \in \mathcal{O}(1)$ is true.

Question 3

Question 4