

Worksheet 5

$$\begin{aligned} 1.a. & \neg (\exists M \in \mathbb{R} \exists x_0 \in \mathbb{R} \forall x > x_0 |f(x)| \leq M|g(x)|) \\ & = \forall M \in \mathbb{R} \forall x_0 \in \mathbb{R} \exists x > x_0 \neg (|f(x)| \leq M|g(x)|) \\ & = \forall M \in \mathbb{R} \forall x_0 \in \mathbb{R} \exists x > x_0 |f(x)| > M|g(x)| \end{aligned}$$

we now use $f(x) \neq O(g(x))$ to mean this. Same for Big- Ω and Big- Θ .

$$1.b. \forall n \in \mathbb{R} ((f(n) > g(n)) \wedge (f(n) \neq \Theta(g(n))))$$

$$1.c. (f(n) \neq O(g(n))) \rightarrow (g(n) \neq \Omega(f(n)))$$

2.a. The output type is an integer.

2.b.

4.a. An optimization problem is a problem in which the goal is to optimize (minimize, maximize) a function subject to some constraints.

4.b. A greedy algorithm is one that, at every step, makes the best choice from the options it has at that step.

4.c.

j	-	1	1	2	2	3	3
S	\emptyset	\emptyset	$\{t_1\}$	$\{t_1\}$	$\{t_1, t_2\}$	$\{t_1, t_2\}$	$\{t_1, t_2, t_3\}$

j	4	5	5	6
S	$\{t_1, t_2, t_3\}$	$\{t_1, t_2, t_3\}$	$\{t_1, t_2, t_3, t_5\}$	$\{t_1, t_2, t_3, t_5\}$

j	6	7	8
S	$\{t_1, t_2, t_3, t_5, t_6\}$	$\{t_1, t_2, t_3, t_5, t_6\}$	$\{t_1, t_2, t_3, t_5, t_6\}$