

1. Mark the following as **True** or **False**. Briefly but convincingly justify all of your answers using the definition of $O(\cdot)$, $\Theta(\cdot)$ and $\Omega(\cdot)$

1. $n = O(n \log(n))$

2. $n^{1/\log(n)} = \Theta(1)$.

3. If
$$f(n) = \begin{cases} 5^n & \text{if } n < 2^{1000} \\ 2^{1000}n^2 & \text{if } n \geq 2^{1000} \end{cases}$$
 and $g(n) = \frac{n^2}{2^{1000}}$, then $f(n) = O(g(n))$.

4. For all the possible functions $f(n)$, $g(n) \geq 0$, if $f(n) = O(g(n))$, then $2^{f(n)} = 2^{O(g(n))}$.

5. $5^{\log \log(n)} = O(\log(n)^2)$

6. $n = \Theta(100^{\log(n)})$