University of Nevada, Las Vegas Computer Science 477/677 Fall 2019

Answers to Assignment 1: Due Wednesday August 28, 2019

1. Problem 0.1 on page 8 of the textbook. In each of the following situations, write O, Ω. Θ in the blank.

   (a) $n - 100 = \Theta(n - 200)$

   (b) $n^{1/2} = O(n^{2/3})$

   (c) $100n + \log n = \Theta(n + \log^2 n)$

   (d) $n \log n = \Omega(10n + \log(10n))$

   (e) $\log(2n) = \Theta(\log(3n))$

   (f) $10 \log n = \Theta(\log(n^2))$

   (g) $n^{1.01} = \Omega(n \log^2 n)$

   (h) $n^2 / \log n = \Omega(n \log^2 n)$

   (i) $n^{0.1} = \Omega(\log^2 n)$

   (j) $(logn)^{\log n} = \Omega(n / \log n)$

   (k) $\sqrt{n} = \Omega(\log^3 n)$

   (l) $n^{1/2} = O(5^{log_2 n})$

   (m) $n2^n = O(3^n)$

   (n) $2^n = \Theta(2^{n+1})$

   (o) $n! = \Omega(2^n)$

   (p) $\log n^{\log n} = O(2^{(\log_2 n)^2})$ [hard]

   (q) $\sum_{i=1}^{n} i^k = \Theta(n^{k+1})$

2. Work problem 0.3(c) on page 9 of the textbook.

$$\log_2 \left(\frac{1 + \sqrt{5}}{2} \right)$$

3. For any positive integer input, say n, the second column is a string of bits. What does that bitstring represent?

   The binary numeral for n, written in reverse.