YSC2229: Exercise 02-2: Asymptotic Annotations

1. Prove or disprove that:

   (a) $5 \log n = O(n)$

   (b) $5 \log n = \Omega(n)$

   (c) $n^2 \neq O(n)$

   (d) $3n^2 + 8n \log n = \Theta(n^2)$

   (e) $2^n = O(n^2)$

   (f) $n \log n = O(n)$

   (g) $n \log n = \Omega(n)$

   (h) $\lfloor n \rfloor = O(n)$

   (i) $\lfloor n \rfloor = \Omega(n)$

   (j) $\lceil n \rceil = O(n)$

   (k) $\lceil n \rceil = \Omega(n)$

   (l) $n^2 + 4n + 17 = O(n^2 + 4n + 17)$

   (m) $3n^4 + 1 = O(n^4/2)$

2. What is the big-O (as tight as possible) for:

   (a) $(n + 1) \log(n^2 + 1) + 3n^2$

   (b) $\lfloor n \rfloor \lceil x \rceil$

   (c) $2n^3 + n2 \log n$

   (d) $\frac{(n^4 + 5 \log n)}{(n^4 + 1)}$

   (e) $(n^2 + 8)(n + 1)$

   (f) $n!$

3. What is the big-Theta for:

   (a) $(n + 1) \log(n^2 + 1) + 3n^2$

   (b) $\log(n^2 + 1)$

   (c) $\log_{10} n$