

CSE 2321 WorkSheet 2 / Practicing for Exam 2

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March 18, 2022

Question 1.

[3 points] Given the following algorithm, write the summations that represent the running time of the algorithm and solve them to determine an upper bound. You must show all your work without doing a line-by-line analysis.

begin algorithm

```
(1)  x=0;
(2)  for (i = 1; i <= n; i++)
(3)    for (j = 1; j <= 3i3; j++)
(4)      x=x+(i-j);    // execution cost is c.
(5)  return x;
end algorithm
```

Question 2.

[5 points] Find upper and lower bounds for the running time of the algorithm represented by the following summation $f(n) = \sum_{i=n}^{4n^3} \sum_{j=i}^{8n^3} c$, where c is the execution cost of the statement that contributed most to the running time of the algorithm.

Question 3.

[3 points] Use the Big-Oh definition to prove that $n^{3/2} + \sqrt{n} \sin n + n \log n = O(n^2)$.

Question 4.

[2 points] Use the Big-Omega definition to prove that $4n^2 + n + 1 = \Omega(n^2)$.

Question 5.

[2 points] Use the Big-Theta definition to prove that $n^5 + n^3 + 7n + 1 = \Theta(n^5)$.