Quiz Questions: Complexity of Algorithms

1. If for an algorithm time complexity is given by $O((3/2)^n)$ then complexity is:
   a. Quadratic
   b. Cubic
   c. Exponential
   d. Rational

2. What is the least integer n such that $f(x) = 3x^3 + (\log x)^4$ is $O(x^n)$:
   a. 1
   b. 2
   c. 3
   d. 4

3. Let k be a positive integer, then $1^k + 2^k + \cdots + n^k$ is:
   a. $O(k^{n+1})$
   b. $O(n^{k+1})$
   c. $O(\log_k n)$
   d. $O(kn^2)$

4. The big-O estimate for $\sum_{j=1}^{n} j(j+1)$ *is*:
   a. $O(2^n)$
   b. $O(n^2)$
   c. $O(\log n)$
   d. $O(n^3)$

5. Algorithm **A** and **B** have a worst-case running time of $O(n)$ and $O(\log n)$, respectively.
   a. For all A, B, I A runs faster than B for input I
   b. For all A, B, I B runs faster than A for input I
   c. For all B exists A for all I B runs faster than A for input I
   d. None of the possibilities is correct

6. Which of the following are ordered by increasing complexity:
   a. $n \log n^2 < n(\log n)^2 < n^2$
   b. $n^2 < n \log n^2 < n(\log n)^2$
   c. $n(\log n)^2 < n \log n^2 < n^2$
   d. $n \log n^2 < n^2 < n(\log n)^2$

7. Which of the following is correct?
   a. $x^3 is\ o(x^2)$
   b. $x^3 is\ o(x^{\frac{3}{2}})$
   c. $x^3 is\ o(x^3)$
   d. $x^3 is\ o(x^4)$

8. The complexity of adding two n x n matrices is
   a. $O(n)$
   b. $O(n^2)$
   c. $O(n^3)$
   d. $O(2^n)$