Practice Recurrence Relations

Question 1. Solve the following recurrence relation?
T(n) = 7T(n/2) + 3n^2 + 2

(a) O(n^2.8)
(b) O(n^3)
(c) θ(n^2.8)
(d) θ(n^3)

Question 2. Sort the following functions in the decreasing order of their asymptotic (big-O) complexity: f1(n) = n^√n , f2(n) = 2^n, f3(n) = (1.000001)^n , f4(n) = n^(10)*2^(n/2)

Question . f(n) = 2^(2n)
Which of the following correctly represents the above function?
(a) O(2^n)
(b) **Ω**(2^n)
(c) Θ(2^n)
(d) None of these

Question 4. Master's theorem can be applied on which of the following recurrence relation?
(a) T (n) = 2T (n/2) + 2^n
(b) T (n) = 2T (n/3) + sin(n)
(c) T (n) = T (n-2) + 2n^2 + 1
(d) None of these

Question 5. T(n) = 3T(n/2+ 47) + 2n^2 + 10*n – 1/2. T(n) will be
(a) O(n^2)
(b) O(n^(3/2))
(c) O(n log n)
(d) None of these

Question 6: Find a recurrence relation and initial conditions for 1,5,17,53,161,485….

Question 7: Check that $a_n=2^n+1$ is a solution to the recurrence relation $a_n = 2a_{n-1} - 1$ with $a_1 = 3$.

Question 8: Find the next two terms in (an), n ≥ 0, beginning 3, 5, 11, 21, 43, 85, …. Then, find a recursive definition. Finally, use the characteristic root technique to find a closed formula for the sequence.

Question 9: Solve an $=7a_{n-1} - 10a_{n-2}$ with $a_0 = 2$ and $a_1 = 3$.

Question 10: Find the solution to the recurrence relation $a_n=3a_{n-1} + 4a_{n-2}$ with initial terms $a_0=2$ and $a_1 = 3$.

CPSC3120_F22