CRASH COURE 2025

DS & AI

Algorithms

DPP

Analysis of an algorithms

Q1 Sort the functions in ascending order of asymptotic(big-O) complexity.
$f_1(n) = n$, $f_2(n) = 80$, $f_3(n) = n^{\log n}$, $f_4(n) = \log\log^2 n$, $f_5(n) = (\log n)^{\log n}$
(A) $f_2(n), f_4(n), f_1(n), f_5(n), f_3(n)$
(B) $f_2(n), f_1(n), f_4(n), f_5(n), f_3(n)$
(C) $f_2(n), f_1(n), f_4(n), f_3(n), f_5(n)$
(D) $f_1(n), f_1(n), f_4(n), f_3(n), f_2(n)$

Q2 Consider two function $f(n) = 10n+2\log n$ and $g(n) = 5n + 2(\log n)^2$, then which of the following is correct option?
(A) $f(n) = \theta(g(n))$
(B) $f(n) = O(g(n))$
(C) $f(n) = \omega(g(n^2))$
(D) None of the above

Q3 Consider two function $f(n) = \sqrt{n}$ and $g(n) = n \log n + n$ then $f(n)/g(n)$ is equivalent to how many of the following given below? _____.
(a) $o(n^{-1/2})$
(n) $O(n^{-1/2})$
(c) $\Omega(1/\log n)$
(d) $\theta(n^{-1/2})$

Q4 Consider the following C-code

```
void foo (int x)
  {
     int a = 1;
     if (n = = 1)
     return;
for (a=1; a ≤ n; a++)
     {
        printf("GATEWALLAH");
        break;
     }
  }
```

What is the worst time complexity of above program?
(A) O(1) (B) O(n)
(C) O (log n) (D) $O\sqrt{n}$

Q5 Consider the following asymptotic functions :
$f1 = 2^n$
$f2 = 1.001^n$
$f3 = e^n$
$f4 = n!$
Which of the following is correct increasing order of above functions?
(A) f3, f4, f1, f2 (B) f2, f4, f1, f3
(C) f3, f2, f1, f4 (D) f2, f1, f3, f4

Q6 Consider the following functions
$f_1(n) = 4^{2^n}$
$f_2(n) = n!$
$f_3(n) = 4^{e^n}$
$f_4(n) = n^{nn}$
Which of the following is/are correct?
(A) $f_1(n) = O(f_2(n))$
(B) $f_1(n) = O(f_4(n))$
(C) $f_1(n) = O(f_3(n))$
(D) $f_2(n) = O(f_3(n))$

Q7 Consider two function $f_1(n) = n^{2^n}$ and $f_2(n) = n^{n^2}$ then which of the following is true.
(A) $f_1(n) = O(f_2(n))$
(B) $f_1(n) = \theta(f_2(n))$
(C) $f_1(n) = \omega(f_2(n))$

(D) None of these

Q8 $f(n) = \Sigma_{i=1}^{n} i^3 = x$, choices for x

I. $\theta(n^4)$ II. $\theta(n^5)$

III. $O(n^5)$ IV. $\Omega(n^3)$

(A) I, II, III

(B) II, III, IV

(C) I, II,. III, IV

(D) I, III, IV

Answer Key

Q1	(A)	Q5	(D)
Q2	(A, B)	Q6	(B, C, D)
Q3	2	Q7	(C)
Q4	(A)	Q8	(D)