

Q1. (5)  
Q2. (C)

48  
SIF

94

EA 869 - Turma A - 1. Semestre 2008  
Prova 1 - 13/03/2008 - Prof. Léo Pini Magalhães.

(sem consulta)

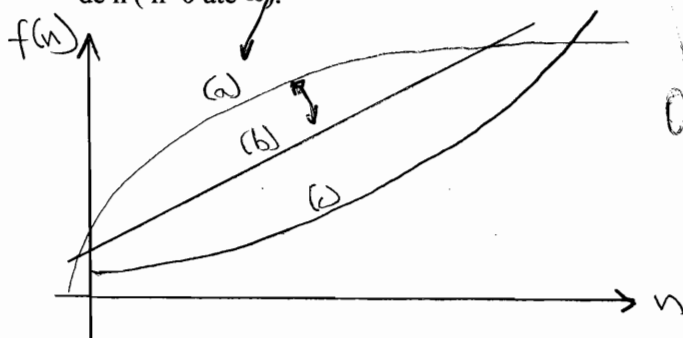
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RA123456: 06A144

Q1. (4,0) Na resolução de um problema você pode optar por 3 algoritmos que têm as seguintes funções de complexidade temporal:

- Algoritmo 1:  $A + B \cdot n$
- Algoritmo 2:  $C + D \cdot \log_2 n$
- Algoritmo 3:  $E + F \cdot n^2$  (sendo  $n$  o tamanho da entrada e  $A, B, C, D, E, F$  ctes)

(a) Mostre graficamente o comportamento da complexidade assintótica dos algoritmos em função de  $n$  ( $n=0$  até  $\infty$ ).



OK { (a)  $\rightarrow C + D \log_2 n$  [ $O(\log_2 n)$ ]  
(b)  $\rightarrow A + Bn$  [ $O(n)$ ]  
(c)  $\rightarrow E + Fn^2$  [ $O(n^2)$ ]

$f(n)$  relaciona o tempo de execução do algoritmo ao tamanho  $n$  da entrada.

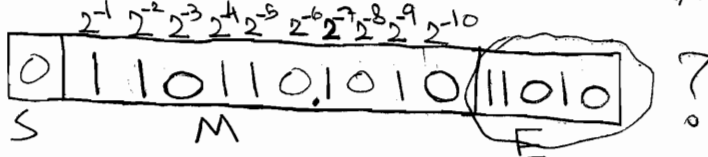
(b) Seria possível qualquer um dos três algoritmos ser a solução ideal para o intervalo  $n=0$  até  $n=n_1$ ? Justifique (que sim ou que não).

Sim [bastando encontrar qual dos três algoritmos apresenta melhor comportamento (menor tempo para ser executado/computado) dentro do intervalo  $n=0$  até  $n=n_1$ . Isto pode ser conhecido graficamente, por exemplo.

Q2. (3,0) Considere uma representação numérica para números em ponto flutuante com as seguintes características:

- 16 bits - sinal, mantissa com 10 bits e expoente em complemento de 2 com 5 bits
- normalizada

(a) represente o número:  $+5$  "RA5", "RA2" 8 = 54,68



$E = 2^6$

$G_0 = 00110_2$

$G_0 = 11010$

$S=0 \rightarrow$  positivo

$S=1 \rightarrow$  negativo

54,68  
14 27,12  
07 13,12  
07 6,12  
03 3,12  
01 1,12  
01 0,68  
01 0,36  
01 0,18  
01 0,09  
01 0,045  
01 0,0225  
01 0,01125  
01 0,005625  
01 0,0028125  
01 0,00140625  
01 0,000703125  
01 0,0003515625  
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01 0,000087890625  
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01 0,000000000

(b) forneça a precisão da mantissa e a precisão da faixa do item (a)

Precisão da Mantissa:  $2^{-10}$

Precisão da Faixa:  $2^{-10} \times 2^6 = 2^{-4}$

(c) forneça a representação do maior número negativo e do menor número positivo

Maior número negativo:

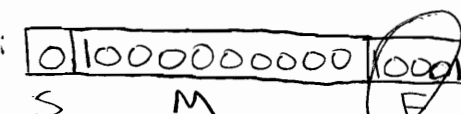
$2^{-15}$

$-15_{10} = 10001_{12}$



$= (-2^{-1} \times 2^{-15})_{10}$

Menor número positivo:



$= (2^{-1} \times 2^{-15})_{10}$

critério adequado,  
99 é o número

Q3. (3,0) Marque as afirmações como V ou F. Uma escolha errada anula uma escolha correta.

- ☒ F (a) resolver um problema exige a verificação se o procedimento possui complexidade no máximo exponencial;
- ☒ F (b) algoritmo ou procedimento designa as propriedades de um conjunto de operações a serem executadas em um computador;
- ☒ (c) procedimentos não definem problemas computáveis e finitos; a
- ☒ V (d) linguagens de alto nível lógico e linguagens de baixo nível lógico permitem expressar algoritmos;
- ☒ V (e) árvores definem relações hierárquicas entre dados;
- ☒ F (f) problemas computáveis são sempre expressos por algoritmos com complexidade de ordem até polinomial;
- ☒ V (g) resolver um problema exige a verificação se existe um procedimento que resolve o problema desejado e programação deste em uma linguagem de programação;
- ☒ (h) problemas P, polinomiais, sempre tem um algoritmo para a sua solução;
- ☒ V (i) interpretadores geram o código executável e o executam passo a passo;
- ☒ F (j) pilhas e filas, ao permitirem acesso direto a todos os seus elementos, são muito adequados ao tratamento de problemas que exijam acesso rápido a seu conjunto de dados;

$$2^5 = 32 \quad (0 \approx 31)$$

00000  
00001  
00010  
00011  
00100  
00101  
00110  
00111  
01000  
01001  
01010  
01011  
01100  
01101  
01110  
01111