OILL	SOLUTION.	
QUIL		

1) Comprovion Ratio measures the worst performance of greedy algorithm over all the input compared to optimal greedy algorithm over all the input compared to optimal inatching. It divides the yourst number of matching of matching in optimal algorithm by the number of matching in optimal scenario. (Magreedy) Compitative Ratio = min all possible ilp (Mophimal)	
C. Political and Company of the Comp	3
[POINT] worst case = { (1, e), (1, d)}.	1
[1 POINT] 2 0 potional case = {(1,a)(2,b)(3,c)	_
(A/d) (1)	
3 ° C C C C C C C C C C C C C C C C C C	-
40 -is roads breeing Clair Company	Ţ
	E
I averies that are in optimal Scenairo	
) Que the set of specially algorithm. A is the set	Ī
but matched in america queries in set Q.	E
but matched in award greedy algorithm. A is the set of ads that are linked to queeies in set Q.	Ī
I he coure als in A must already se material	Ē
[Marriedy] > [A) because with a query is & and	
otherwise, they will the first place	
I Marriedy > A because add in 1 must already be matched (Marriedy > A because add in 1 must already be matched otherwise, they will match with a query is of and otherwise, they will match with a query is of and that query won't be in of in the tirst place that query won't be in of in the tirst place Also . A > Q because for each query in Q r there has Also . A > Q because for each query in Q r there have	
heave for each query on sp	ĪT
Also . A \geq Q because for each question we have the be at least one linked ad. Therefore, we have this study source was downloaded by 100000808761009 from coarse parcel por com 5004 200 12:35:50 GMT 105:00 GMT 105:	
to be at least one	
This study source was downloaded by 100000808761009 from course Has.com on 04 2000 12:35:50 GMT (05:00 6 MT) the 9 www.coursehero.com/file/89313937/quiz14uperatedpdf/	Í
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Lots says Q' is the set of queries that are matched then [Mgreedy] > 1011 because all queries in Q' must be matched in [Mgreedy].

Theorefore, Moptimal = 191+1911 = 191+ | Mgreedy) and in the worst when I Myrierdy I is as small as possible, it is equal to 101, so | Mophinal | = 2X | Mgreedy), and the competitive vatio 1/2 = 0.5. [POINT]

4) 9 (A)	Ad)	Remainey Budget for A 1	Budget for A 2
[IPOINT] At start	10 N	40	50
1st query	A2 (00)	40	4000
	Al	20	40,0
2nd query	Az	20	30
3rd query	A ₂	20	20
5th query	A	80	20
6th queey	A ₂	0	10
7th query	A ₂	0	0
8th query	7.4		- n

5) Suppose we have N advertisers A1, A2 --, each with budget B, so is the optimal Remario we exhaust all the budget and the revenue is NXB.

In Balance Algorithm, we assign each query to advertisery [I POINT] equally and project those with high budget. For round i, we assign the query equally to advertises Ai, Airi-

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This process stops when $\frac{B}{N} + \frac{B}{N-1} + \frac{B}{N-2} + \cdots + \frac{B}{N-2}$ $\frac{B}{N} + \frac{B}{N-1} + \frac{B}{N-2} - \cdots + \frac{B}{N-j+1}$ [IPOINT] ((1+1/2+1/3+--+1/N) - (1+1/2+1/3+--+1/N-j) According to Euler, 1+ 1/2+ 1/3+ . - . + 1/w = log N when N is big enough, so the formula above be Converted to logN - loge > 1, and in the worst Case when the sign is equal, we can get j= N-1/2 so the approx. revenue is $B(N-\frac{N}{e})$, divided by optimal revenue BN, we can get compétitive ratio [POINT]

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