a)
$$\lim_{n\to\infty} \frac{f(n)}{g(n)} \frac{n^2+7n}{n^3+7} = \frac{n^2(1+7/n)}{n^2(n+7/n^2)} = \frac{1+7/n}{n+7/n^2}$$

$$\lim_{n\to\infty} \frac{1+3/n}{n+3/n^2} = \frac{1}{\infty} = 0.50 f(n) = O(g(n))$$

$$= 12 + 2n$$

$$\frac{n^2 \ln 2}{2n+b} = \frac{12n^2 \ln 2 + 2n}{(2n+b) \cdot (n^2 \ln 2)} = \frac{12n^3 \ln 2 + b}{2n^3 \ln 2 + b}$$

$$= \frac{\prod (12n\ln 2+2)}{\prod (2n^2\ln 2+6n\ln 2)} = \frac{12n\ln 2+2}{2n^2\ln 2+6n\ln 2}$$

$$=\frac{8(12\ln^2+2/n)}{n(2n\ln^2+6\ln^2)}=$$

$$= \lim_{n \to \infty} \frac{12 \ln 2 + 2/n}{2n \ln 2 + 6 \ln 2} = \frac{1}{\infty} = 0$$

o, we should use and

accordinate regular are come limited into of

A' The within limit moreone is it is recall in

is higher than other one. His certain,

that I and > . But there is not an appealedy.

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C) lim D logo 30 =) Derivative both side

 $\frac{1. \log_2 30 + 0.3}{30 \ln 2} = \frac{\log_2 30 + 1/\ln 2}{1 + \frac{3}{0 \ln 2}}$

= log_3n. ln2+1 (log, 3n ln2+1). nln2+3 $\frac{n \ln 2 + 3}{n \ln 2} \qquad \frac{n \left(\log_2 3n \ln 2 + 1\right)}{n \left(\ln 2 + 3 \ln 1\right)}$

= $\lim_{n\to\infty} \frac{\log_2(3n) \cdot \ln 2 + 1}{\ln 2 + 3/n} = \infty$ (50 f(n) = 12 (9(n)0)

d) lim 12+51 => Growth rate of n'is bigger than 2n. So results as

50 f(n) = 12 (g(n))

Other g(n) = o (f(n))

e) lim 3/21 = 23.13 =) Derivative both side

 $= \frac{1}{3} \cdot 2^{1/3} \cdot n^{-2/3} = n^{-2/3 + 1/2} = \frac{1}{2} \cdot 3^{1/2} \cdot n^{-1/2} = 0$

f(n) = 0 (q(n))

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Tarih:...../201

- a) $sysout =) T_1(n) = \Theta(1)$ } $T(n) = T_1(n) * T_2(n)$ for $loop =) T_2(n) = \Theta(n)$ = $\Theta(n)$
- b) String assignment = $\Theta(1)$ => $T_1(n)$ for loop = $\Theta(n)$ => $T_2(n)$ each calling of method $A = \Theta(n)$ => $T_3(n)$ $T(n) = T_1(n) + T_2(n) * T_3(n)$ = $\Theta(1) + \Theta(n,n)$ = $\Theta(n^2)$
- C) if there is not i increment this is finite loop.

 I assume that end of the while loop (1++,')

 assign of $i = \Theta(1) \Rightarrow T_1(n)$ While control = $\Theta(n+1) = \Theta(n) = T_2(n)$ Sys. aut = $\Theta(1) \Rightarrow T_3(n)$ $1++,' = \Theta(1) = T_1(n)$ $T(n) = T_1(n) + T_2(n) \cdot T_3(n) + T_2(n) \cdot T_4(n)$ $T(n) = \Theta(n) + \Theta(n) \cdot \Theta(1) + \Theta(n) \cdot \Theta(1)$ $T(n) = \Theta(n)$

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d) assignment of
$$i = \Theta(1) = T_1(n)$$

while control \rightarrow Best case $T_0(n) = \Theta(1)$

Sys. at $= \Theta(1) \Rightarrow T_2(1)$

it+; $= \Theta(1) = T_3(1)$

Thest $= \Theta(1)$

Tworst =
$$\Theta(1) + \Theta(n) \cdot (\Theta(1) + \Theta(1))$$

= $\Theta(n)$

3) First method

Assignment of
$$i = \Theta(1)$$

Sys. out = $\Theta(1)$ } length of array times, which in

$$T(n) = \Theta(1) + \Theta(2n) = \Theta(2n+1) = \Theta(n)$$

Second method

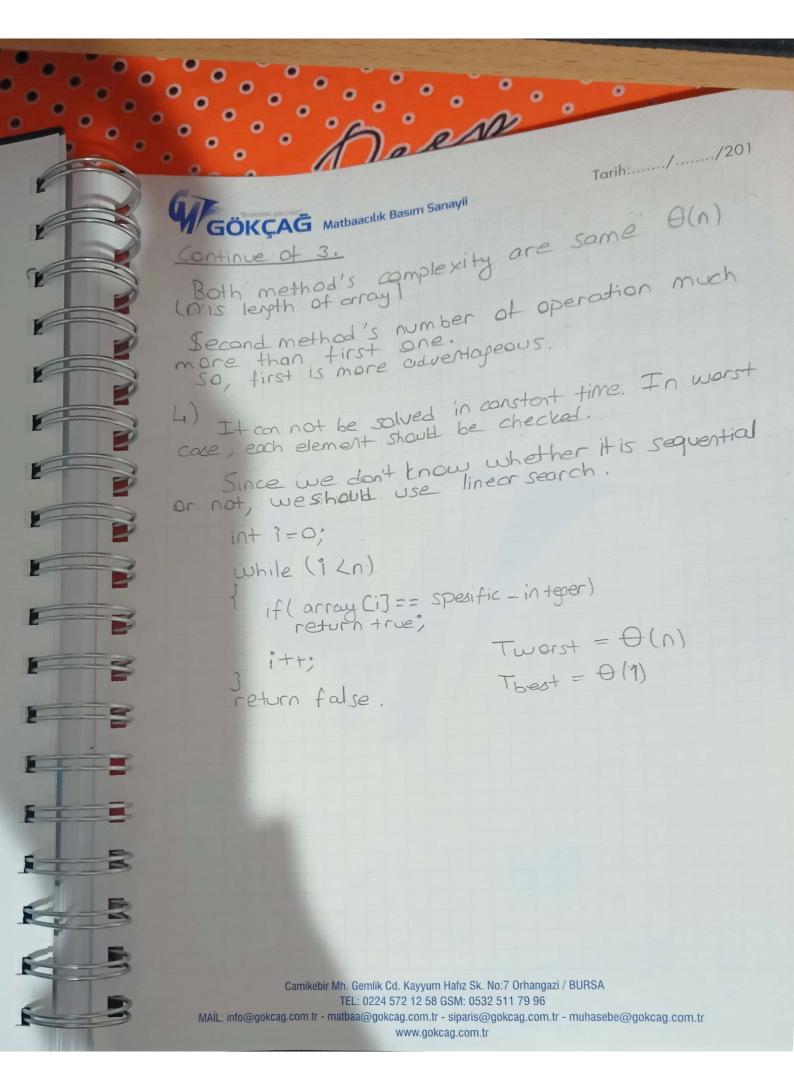
Assignment of
$$i = \Theta(1)$$

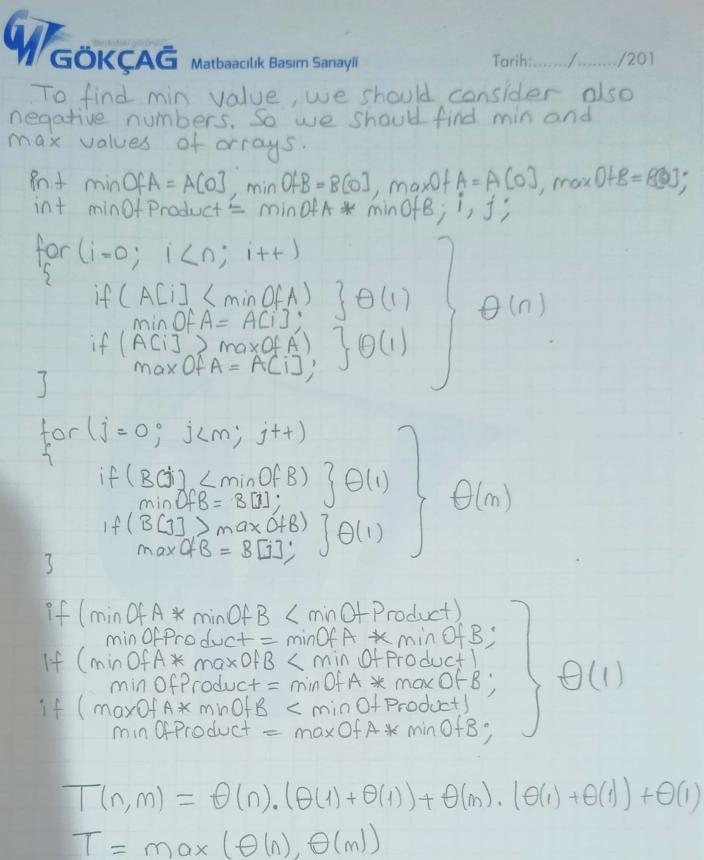
length check = $\Theta(n+1)$
increment of $i = \Theta(n)$

$$S_{s} \cdot \omega + = \Theta(1)$$

 $T(n) = \Theta(1) + \Theta(n+1) + \Theta(n) + \Theta(n) + \Theta(n) \cdot \Theta(1)$
 $= \Theta(3n+2) = \Theta(n)$

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 $T = max(\Theta(n), \Theta(m))$

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