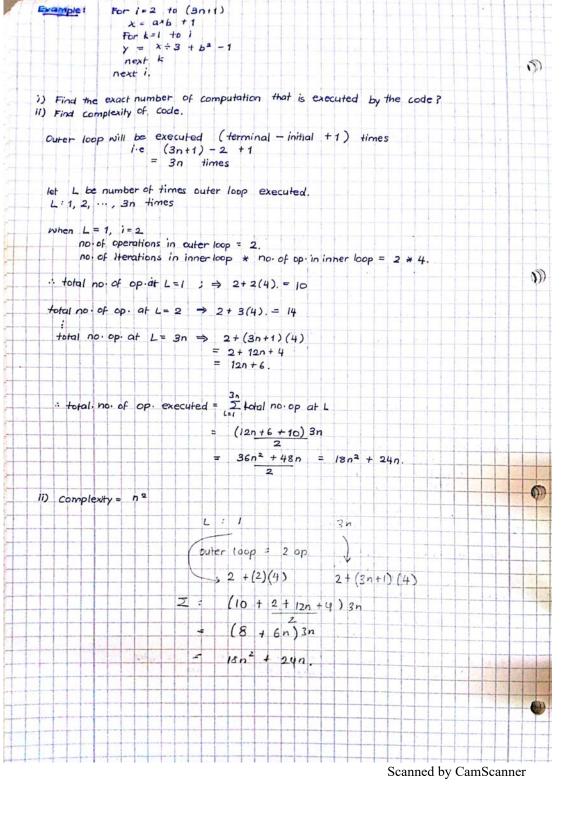
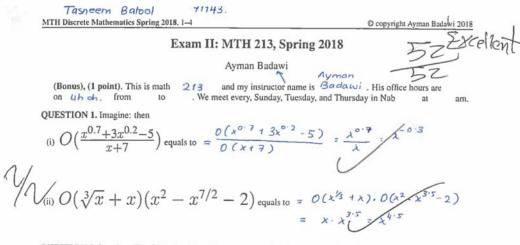
	pr-2018 Complexity of an Algorithm.
	$O(n^2 + 3n + 1) = n^2$ , what does it mean?
	I Fixed no and fixed the constant c (EN) sit
0	
-	$ n^2 + 3n + 1  \leq cn^*, \forall n \geq n_0  n \in \mathbb{N}^*$
	Eq: $O(\sqrt{n} + n) = n$ . $\exists n_0 and c s +  \sqrt{n} + n  \leq cn \forall n \geq n_0$
	$\exists n = unu \in sir  [\forall n \neq n] \leq Cn \forall n \ge n_0$
	Definition: Polynomials, $P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$
-	where $a_0, a_1, \dots, a_n$ are $\mathbb{R}$
	and all n EN.
	Eg: 2x <sup>2</sup> +7x+2 is a polynomial of degree 3.
	$2x^3 + 2x$ is not a polynomial.
-	Fact : 0 (polynomial) = n highert dag exponent
	- degree
0	Eq: $O(2x^3 + 10x^5 - 7x + 10) = x^5$
-	
	Definitions: Lets call $2x^{\frac{3}{2}} + x^{\frac{1}{2}} + x + 2$ mini-polynomials
	ie looks like polynomial but all exponents are positive rational numbers.
	Fact: O(mini polynomial) = n highest exponent
-	= n <sup>degree</sup>
	$E_{g}: O(2n^{3/2} + n^{1/2} + n + 2) = n^{3/2}$
8-00	
1-40	<u>r-2018</u> : Observe: eg: $n^2 + 3n + 7 \le n^2 + 3n^2 + 7n^2$
	$\leq 11n^2 \forall n \in \mathbb{N}$ .
	Facts: $O(f_1 + f_2) = \max\{O(f_1), O(f_2)\}$
	$O(f_1 \cdot f_2) = O(f_1) \cdot O(f_2)$
-	$O(f_1 \cdot f_2) = O(f_1) \cdot O(f_2),$ $O(f_1) = O(f_1)$
	$O\left(f_{1} \cdot f_{2}\right) = O\left(f_{1}\right) \cdot O\left(f_{2}\right).$ $O\left(\frac{f_{1}}{f_{2}}\right) = \frac{O\left(f_{1}\right)}{O\left(f_{2}\right)}$
•	$O\left(\frac{f_1}{f_2}\right) = \frac{O(f_1)}{O(f_2)}$
	$O\left(\frac{f_1}{f_2}\right) = O\left(f_1\right)$ $O\left(\frac{f_2}{f_2}\right)$ $mini - function = Mini polynomial$
•	$O\left(\frac{f_1}{f_2}\right) = \frac{O(f_1)}{O(f_2)}$
	$O\left(\frac{f_1}{f_2}\right) = O(f_1)$ $O(f_2)$ mini - function = Mini polynomial mini polynomial
•	$O\left(\frac{f_1}{f_2}\right) = O\left(f_1\right)$ $O\left(\frac{f_2}{f_2}\right)$ $mini - function = Mini polynomial$
•	$O\left(\frac{f_1}{f_2}\right) = O(f_1)$ $O\left(\frac{f_1}{f_2}\right)$ mini - function = mini polynomial mini polynomial rational function = polynomial polynomial.
•	$O\left(\frac{f_{1}}{f_{2}}\right) = O\left(f_{1}\right)$ mini - function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$
	$O\left(\frac{f_{1}}{f_{2}}\right) = O\left(f_{1}\right)$ mini - function = <u>mini polynomial</u> mini polynomial rational function = <u>polynomial</u> polynomial. Hence $O\left(\text{mini - function}\right) = O\left(\text{mini polynomial}\right)$ $O\left(\text{mini polynomial}\right)$
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini - function = <u>mini polynomial</u> mini polynomial rational function = <u>polynomial</u> Polynomial Hence O(mini - function) = O(mini polynomial) O(mini polynomial) and O(rationdl) = O(polynomial)
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O\left(\frac{f_{1}}{O\left(f_{2}\right)}$ mini - function = <u>mini polynomial</u> mini polynomial rational function = <u>polynomial</u> polynomial. Hence $O\left(\text{mini-function}\right) = O\left(\text{mini polynomial}\right)$ $O\left(\text{mini polynomial}\right)$ and $O\left(\text{rationdl}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ $O\left(\frac{f_{1}}{O\left(\text{mini polynomial}\right)}$ $O\left(\frac{f_{1}}{O\left(\text{mini polynomial}\right)}\right)$ $O\left(\frac{f_{1}}{O\left(\text{mini polynomial}\right)}$ $O\left(\frac{f_{1}}{O$
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{2} = O(f_{2})$ Hence = $O(f_{1}) = O(f_{2})$ mini = $f_{2} = O(f_{2})$ mini
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = function = mini polynomial mini polynomial rational function = polynomial polynomial. Hence $O\left(\text{mini} - \text{function}\right) = O\left(\text{mini} \text{ polynomial}\right)$ and $O\left(\text{rationd}\right) = O\left(\text{polynomial}\right)$ $O\left(\text{polynomial}\right)$ .
	$O\left(\frac{f_{1}}{f_{2}}\right) = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{1} = O(f_{1})$ mini = $f_{2} = O(f_{2})$ Hence = $O(f_{1}) = O(f_{2})$ mini = $f_{2} = O(f_{2})$ mini





QUESTION 2. Imagine: The following Algorithm segment. Find the exact number of additions, multiplications, and subtractions that will be performed when the algorithm is executed. Then find the complexity of the Algorithm segment.

Not of outer loop iterations 7 $L = n^{2}+2-3+1 = n^{2}.$ at $L = 1.(k = 3)$ outer loop op : 4 inner loop op = (6)(k+1-1+1) = (6)(4) = 24. total op = 4+24 = 28. at $L = n^{2}$ ( $k = n^{2} + 2$ ) outer loop op = 4 inner loop op = (6)(k+1) = (6)(n^{2}+2+1) (1)(2-2+1)	$m = 7; s = 9$ For $k := 3 \text{ to } (n^2 + 2)$ $L = k * m + 2 * s - 6  4 \text{ op}.$ For $i := 1 \text{ to } (k + 1)$ $s = s + m^3 + i - k^2  6 \text{ op}.$ The maximum + $i - k \ge L$ next k $mext k$ $fix  Sum = (28 + 6n^2 + 22)n^2$ $= (6n^2 + 50)n^2$
= (6)(n <sup>2</sup> +3) = 6n <sup>2</sup> +18. Total 97: 4 +6n <sup>2</sup> +18 = 6n <sup>2</sup> + 22.	$= 3n^{4} + 25n^{2}.$ Complexity: $0(3n^{4} + 25n^{2}) - (n^{4})$
MA V.	
NI	