Assignment of Automata

By,

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# Polynomial Solutions

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# Polynomial #1

$$9x^2 + 3y^2 + 7xy - 9$$

# For $9x^2$

By Rule #1

- 9 is in POLYNOMIAL

By Rule #2

- x is in POLYNOMIAL

By Rule #2

- $x^2$ is in POLYNOMIAL

By Rule #3

- $9x^2$ is in POLYNOMIAL

# For $3y^2$

By Rule #1

- 3 is in POLYNOMIAL

By Rule #2

- y is in POLYNOMIAL

By Rule #2

- $y^2$ is in POLYNOMIAL

By Rule #3

- $3y^2$ is in POLYNOMIAL

# For 7xy

By Rule #1

- 7 is in POLYNOMIAL

By Rule #2

- x is in POLYNOMIAL

By Rule #2

- y is in POLYNOMIAL

By Rule #3

- 7xy is in POLYNOMIAL

# For: $9x^2 + 3y^2 + 7xy - 9$

By Rule #1

- 9 is in POLYNOMIAL

By Rule #3

- $9x^2 + 3y^2 + 7xy - 9$ is in POLYNOMIAL

# Polynomial #2

$$- \quad 3xy^2 + 12x^2 - 7$$

# For $-3xy^2$

By Rule #1

- (-1)3 is in POLYNOMIAL

By Rule #2

- x is in POLYNOMIAL

By Rule #2

- y is in POLYNOMIAL

By Rule #2

- $y^2$ is in POLYNOMIAL

By Rule #3

- $-3xy^2$ is in POLYNOMIAL

# For $12x^2$

By Rule #1

- 12 is in POLYNOMIAL

By Rule #2

- x is in POLYNOMIAL

By Rule #2

- $x^2$ is in POLYNOMIAL

By Rule #3

- $12x^2$ is in POLYNOMIAL

# For: $-3xy^2 + 12x^2 - 7$

By Rule #1

- 7 is in POLYNOMIAL

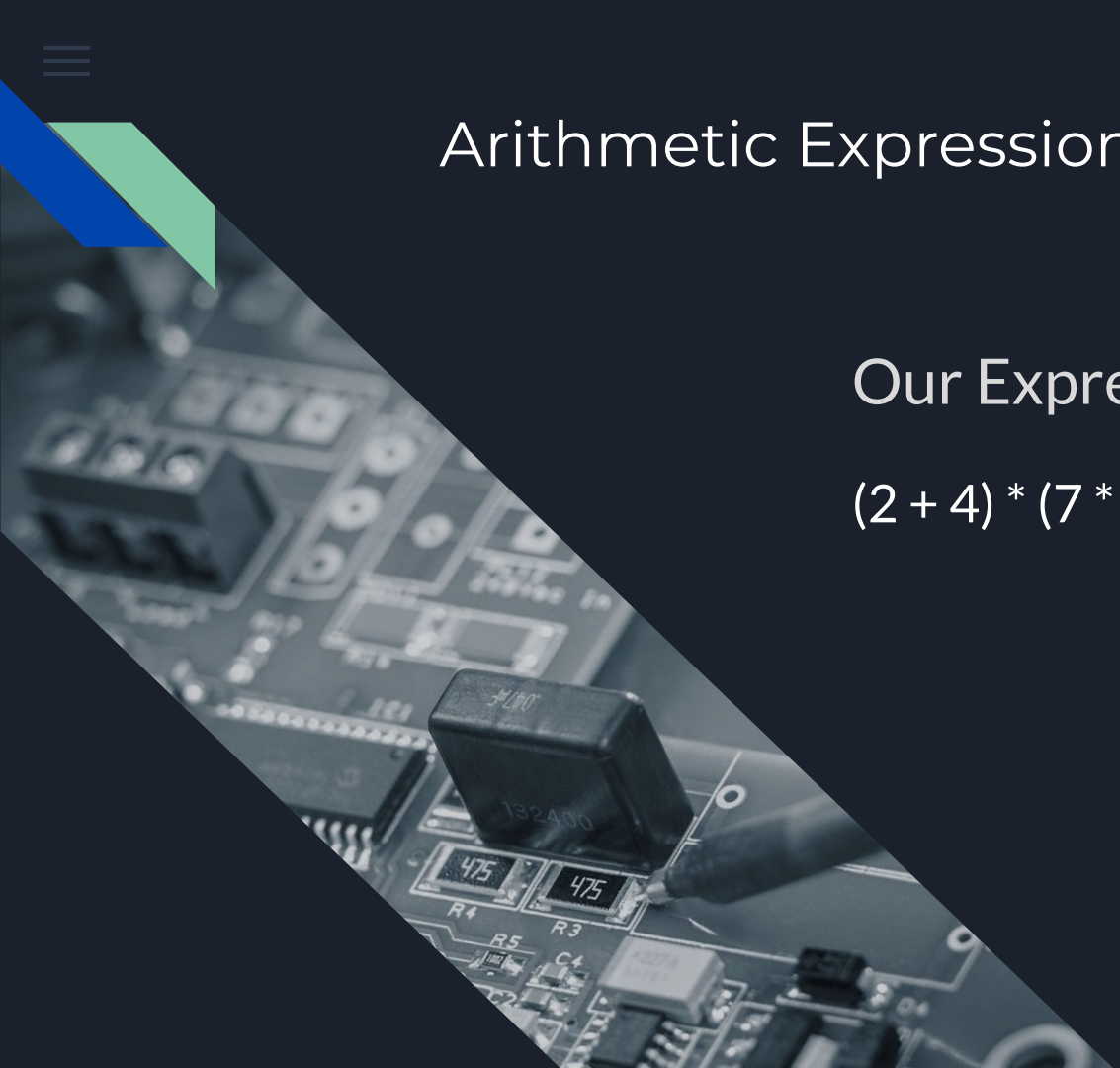
By Rule #3

- $(-1)7$ is in POLYNOMIAL

By Rule #3

- $-3xy^2 + 12x^2 - 7$ is in POLYNOMIAL

# Arithmetic Expression Solution




## Our Expression:

(2 + 4) * (7 * (9 -3) / 4) / 4) * (2 + 8) - 1

# For: (2 + 4) * (7 * (9 -3) / 4) / 4) * (2 + 8) - 1

By Rule #1

- 2, 4, 7, 9, 3, 8, 1 are in AE

By Rule #2

- -3, -1 are in AE

For: (2 + 4) , (2 + 8)

Taking (2+4)

By Rule #3

- + is a valid Arithmetic Operation
- So, ( 2+3 ) is in AE

Taking (2+8)

By Rule #3

- + is a valid Arithmetic Operation
- So, ( 2+8 ) is in AE

For: (9 - 3)

Taking (9 - 3)

By Rule #2

- (-1)3 is in AE

By Rule #3

- 9 + (-1)3 is in AE
- So, (9 - 3) is in AE

# For: (2 + 4) * (7 * (9 -3) / 4) / 4) * (2 + 8) - 1

By Rule #3

- (7 * (9 - 3)) is in AE
- (7 * (9 - 3) / 4) is in AE
- ((7 * (9 - 3) / 4) / 4) is in AE

By Rule #3

- (2 + 4) * ((7 * (9 - 3) / 4) / 4) is in AE
- ((7 * (9 - 3) / 4) / 4) * (2 + 8) is in AE
- (2 + 4) * ((7 * (9 - 3) / 4) / 4) * (2 + 8) is in AE

By Rule #3

- (2 + 4) * ((7 * (9 - 3) / 4) / 4) * (2 + 8) - 1

  is in AE

# Recursive Language

Problems

# Consider the language $S^*=\{a, b\}$. How many words this language have of length 2, 3, and n?

- Language will have $\mathbf{2^2 = 4}$ words of $S^*$, of Length 2
- Language will have $\mathbf{2^3 = 8}$ words of $S^*$, of Length 3
- Language will have $\mathbf{2^n}$ words of $S^*$, of Length n

# Consider the language S*={aa, b}.
# How many words this language have of length 4 & 5?

**Length 4**

- $L_1$ = { aaaa, aabb, baab, bbaa, bbbb }
- Words = 5

**Length 5**

- $L_2$ = { aaaab, aabaa, baaaa, bbbbb, aabbb, bbbaa, bbaab, baabb }
- Words = 8

# Consider the language S*={ab, ba}.
# Write all the words that have 7 or fewer letters.

**Length 4**

- $L_1$ = { aaaa, aabb, baab, bbaa, bbbb }
- Words = 5

**Length 5**

- $L_2$ = { aaaab, aabaa, baaaa, bbbbb, aabbb, bbbaa, bbaab, baabb }
- Words = 8

Consider the language S*={ab, ba}.
Write all the words that have 7 or fewer letters.

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$L_1$ = { ab, ba }
$L_2$ = { abab, abba, baab, baba}
$L_3$ = { ababab, ababba, abbaab, abbaba, baabab, baabba, babaab, bababa}

So, our required Language is L, which is
$L = L_1L_2L_3$

**Can any word in this Language contain the substrings: aaa, or bbb?**

No, Because none of the given substrings are valid strings, if they are from ALPHABET S*

Consider the language S*={a, ab, ba}.
Write all the words that have 7 or fewer letters.

Our required Language is L, which is
L = { Λ, a, ab, ba, aa, aab, aba, aba, abab, abba, baba, baa, baab, aaa, aaab, aaba, ababab, ababa, abaabba, abaab, baaba, baaba, ababa, baaab, ababab, ababba, abbaab, abbaba, baabab, baabba, babaab, bababa, …, bababaa }

**Is the String: ( abbba ) a word in this language?**

No, Because substring is valid strings, if they are not from ALPHABET S*

S* = { aa, aba, baa }
Show the words aabaa, baaabaaa, baaaaababaaaa are all in this language

For aabaa
- (aa)(baa)

For baaabaaa
- (baa)(aba)(aa)

For baaaaababaaaa
- (baa)(aa)(aba)(baa)(aa)

**Can any word in this Language be interpreted as a string of elements from S in two different ways?**

No, because all the given words can only be interpreted as only one way

**Can any word in this Language have an odd total number of “a”s?**

No, because language has always even number of “a”s, so the a word will also has even number of a’s

# The End

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