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Question 1: List Equality

a. [X, Y, | Z] **and** [p, q, r, s, t, | [u, v, y]]

[p, q, r, s, t, | [u, v, y]]
= [p, q, r, s, t, u, v, y]
= [p, q | [r, s, t, u, v, y]]

[p, q | [r, s, t, u, v, y]]
[X, Y, | Z]

X = p
Y = q
Z = [r, s, t, u, v, y]

If X = p, Y = q, and Z = [r, s, t, u, v, y], then the lists [X, Y, | Z] and [p, q, r, s, t, | [u, v, y]] are equal.

b. [a, [Y | [b, c]], d] **and** [a, [b, [b, c]] | Z]

[a, [Y | [b, c]], d]
= [a, [Y, b, c], d]

[a, [Y, b, c], d]
[a, [b, [b, c]] | Z]

These two lists are not equal because the first list ([a, [Y, b, c], d]) expects 3 values within [Y, b, c] whereas, the second list ([a, [b, [b, c]] | Z]) expects two values within [b, [b, c]].

c. [yyz | [yow | [yyc | [yvr | [yul | [YEG]]]]]] **and** [A1, A2 | A3]

[yyz | [yow | [yyc | [yvr | [yul | [YEG]]]]]]
= [yyz, yow | [yyc | [yvr | [yul | [YEG]]]]]
= [yyz, yow, yyc | [yvr | [yul | [YEG]]]]
= [yyz, yow, yyc, yvr | [yul | [YEG]]]
= [yyz, yow, yyc, yvr, yul | [YEG]]
= [yyz, yow, yyc, yvr, yul, YEG]
= [yyz, yow | [yyc, yvr, yul, YEG]]

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[yyz, yow | [yyc, yvr, yul, YEG]]
[A1, A2 | A3]

A1 = yyz
A2 = yow
A3 = [yyc, yvr, yul, YEG]

If A1 = yyz, A2 = yow, and A3 = [yyc, yvr, yul, YEG], then the lists [yyz | [yow | [yyc | [yvr | [yul | [YEG]]]]] and [A1, A2 | A3] are equal.

    d. [apple, Z, bee | [Z, car, door]] **and** [X | [bee, Y | [Q | R]]]

[apple, Z, bee | [Z, car, door]]
= [apple, Z, bee, Z, car, door]

[X | [bee, Y | [Q | R]]]
= [X, bee, Y, Q | R]

[apple, Z, bee, Z, car, door]
[X, bee, Y, Q | R]

X = apple
Z = bee
Y = bee
Q = Z = bee
R = [car, door]

If X = apple, Z = Y = Q = bee, and R = [car, door], then the lists [apple, Z, bee | [Z, car, door]] and [X | [bee, Y | [Q | R]]] are equal.

    e. [Z | [Z | [[Z | [[Z]]]]]] **and** [b | Y]

[Z|[Z|[[Z|[[Z]]]]]]
= [Z, Z | [[Z|[[Z]]]]]
= [Z, Z, [Z | [[Z]]]]
= [Z, Z, [Z, [Z]]]
= [Z | [Z, [Z, [Z]]]]

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[Z | [Z, [Z, [Z]]]]
[b | Y]

Z = b
Y = [Z, [Z, [Z]]]

If Z = b and Y = [Z, [Z, [Z]]], then [Z | [Z | [[Z | [[Z]]]]]] and [b | Y] are equal.

f. [U | [W | [U]]] **and** [the, quick, brown, fox, W]

[U | [W | [U]]]
= [U, W | [U]]
= [U, W, U]

[U, W, U]
[the, quick, brown, fox, W]

U = the
W = quick
U = brown

These two lists are not equal because U cannot be equal to two different values.

g. [first | [U | [[R] | U]]] **and** [Q, [ ], [Q] | U]

[first|[U|[[R]|U]]]
= [first|[U|[[R]|U]]]
= [first, U|[[R]|U]]
= [first, U, [R]|U]
= [first, U, [R] | U]

[first, U, [R] | U]
[Q, [ ], [Q] | U]

Q = first
U = [ ]

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[R] = [Q] = first

If Q = R = first and U = [ ], then the lists [first | [U | [[R] | U]]] and [Q, [ ], [Q] | U] are equal.

h. [Did | [[An, X] | [ever, Win, An, X]]] **and** [Only, [One, oscar] | [Did, X, hammerstein, TheSecond]]

[Did|[[An, X]|[ever,Win, An,X]]]
= [Did, [An, X]|[ever,Win, An,X]]
= [Did, [An, X], ever, Win, An, X]

[Only, [One, oscar] | [Did, X, hammerstein, TheSecond]]
= [Only, [One, oscar], Did, X, hammerstein, TheSecond]

[Did, [An, X], ever, Win, An, X]
[Only, [One, oscar], Did, X, hammerstein, TheSecond]

Did = Only = ever
An = One = hammerstein
X = Win = TheSecond = oscar

If Did = Only = ever, An = One = hammerstein, and X = Win = TheSecond = oscar, then the lists [Did | [[An, X] | [ever, Win, An, X]]] and [Only, [One, oscar] | [Did, X, hammerstein, TheSecond]] are equal.