Augmented Coefficient Matrices

Assessment

Create an R function named `AugCoeffMatrix` which takes a list that contains mathematical functions as input. It should create the augmented coefficient matrix for the functions and return it in a single list variable.

The function must return the following variables in a list, with the following labels:
- `augcoeffmatrix`: the augmented coefficient matrix; and
- `variables`: the variables which are involved in the system of linear equations.

The augmented coefficient matrix should have the dimension names as the following:
- `rownames` is the rank/order of each linear equation; and
- `colnames` is the corresponding variables of the linear equation, the last column being named as RHS (right-hand side).

Take note that for consistency, we shall use the following rules for the system:
- Variables will be x_0, x_1, x_2 and so on.
- If the number of equations is not equal to the number of unknowns, the function will return NA.
- The terms **need not** be ordered when written into the function.
- The equations will be of the form $f(x_0, x_1, x_2, x_3, ..., x_n) = a_0x_0 + a_1x_1 + a_2x_2 + a_3x_3 + ... + a_nx_n + b$. Even if a term will be zero, the variable will still be placed in the parameters and the term will be placed as $... + 0 * x_i + ...$.

As an example, the output for the particular system coded in R will be the following:

```
> E1 <- function (x0, x1, x2) 0.3 * x0 + -0.2 * x1 + 10 * x2 + -71.4;
> E2 <- function (x0, x1, x2) 3 * x0 + -0.2 * x2 + -0.1 * x1 + -7.85;
> E3 <- function (x0, x1, x2) 0.1 * x0 + 7 * x1 + -0.3 * x2 + 19.3;
> system <- list(E1, E2, E3);
> result1 = AugCoeffMatrix(system);
> result1
$variables
[1] "x0" "x1" "x2"

$augcoeffmatrix
  x0   x1   x2    RHS
1 0.3 -0.2 10    71.4
2 3   -0.1 -0.2 7.85
3 0.1 7    -0.3 -19.3
> result1$augcoeffmatrix
  x0   x1   x2    RHS
1 0.3 -0.2 10    71.4
2 3   -0.1 -0.2 7.85
3 0.1 7    -0.3 -19.3
```