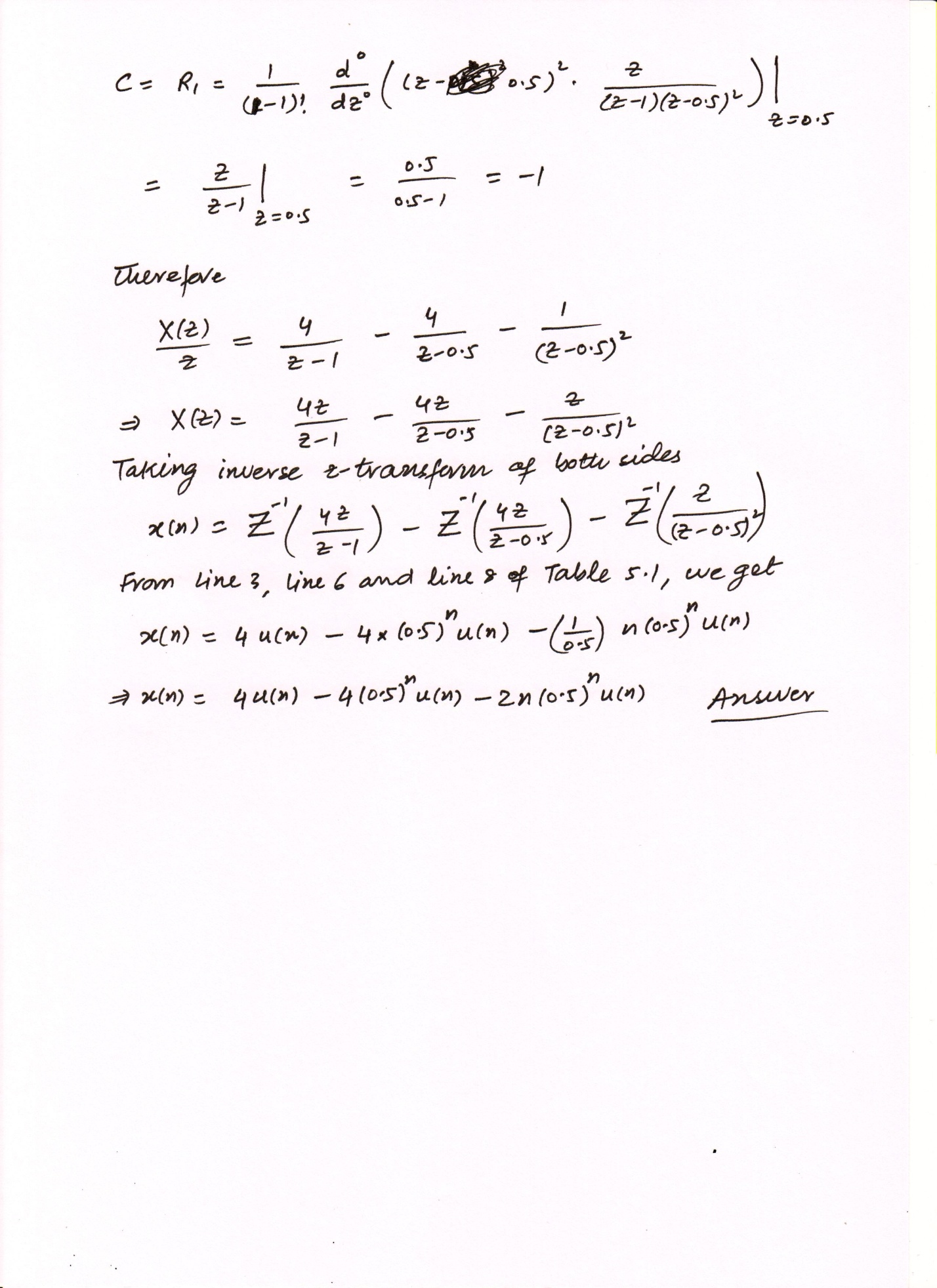
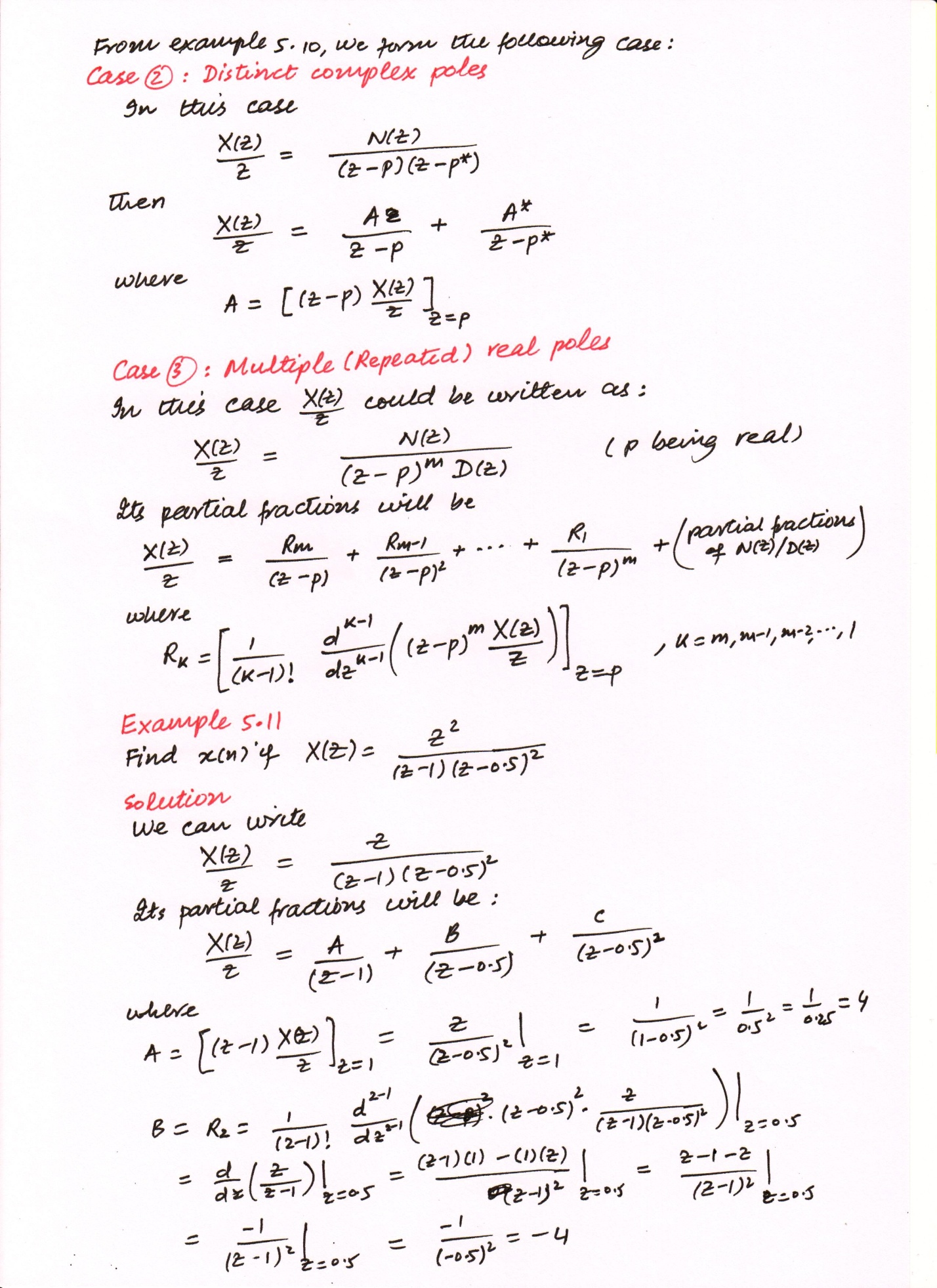
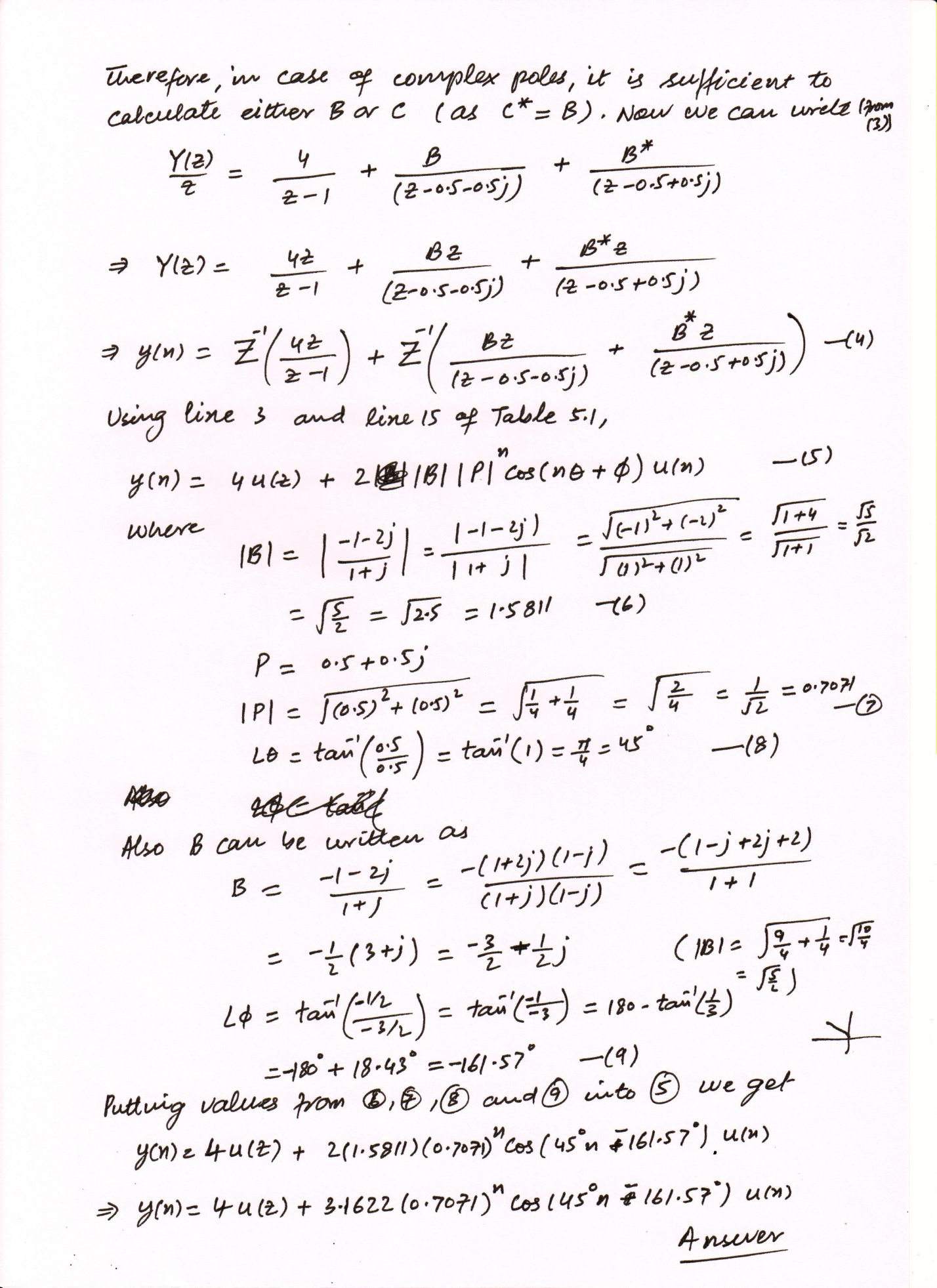
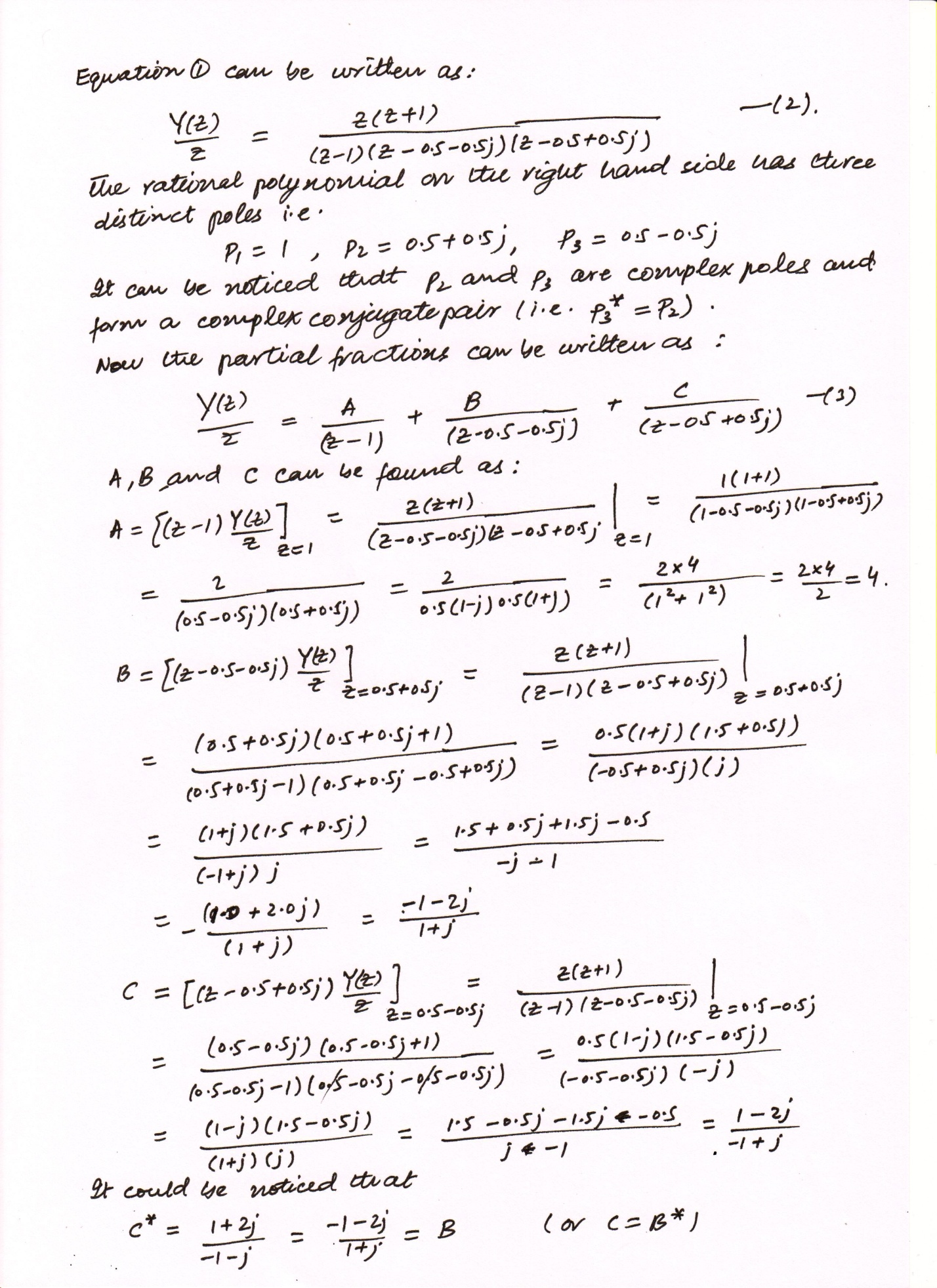
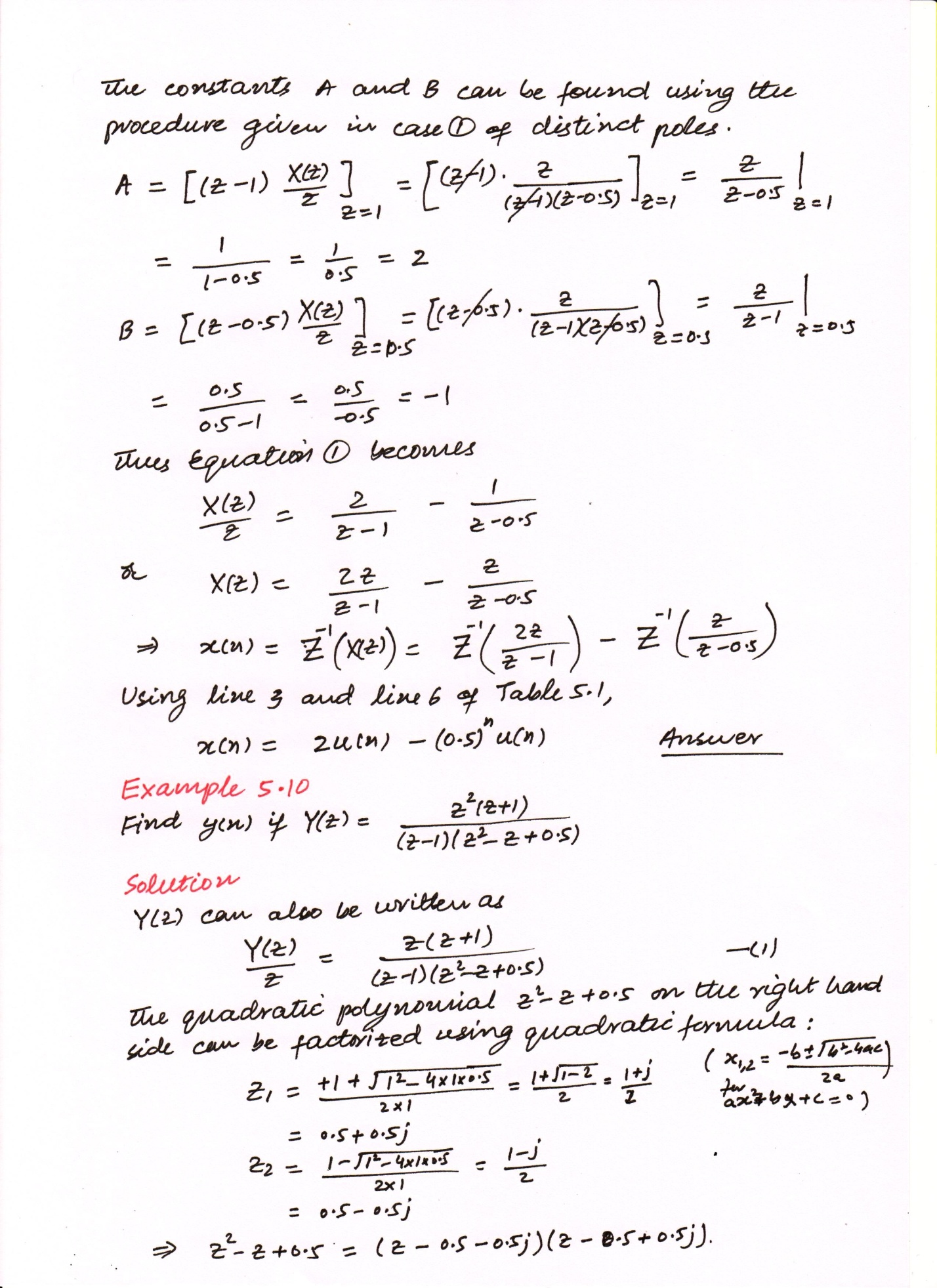
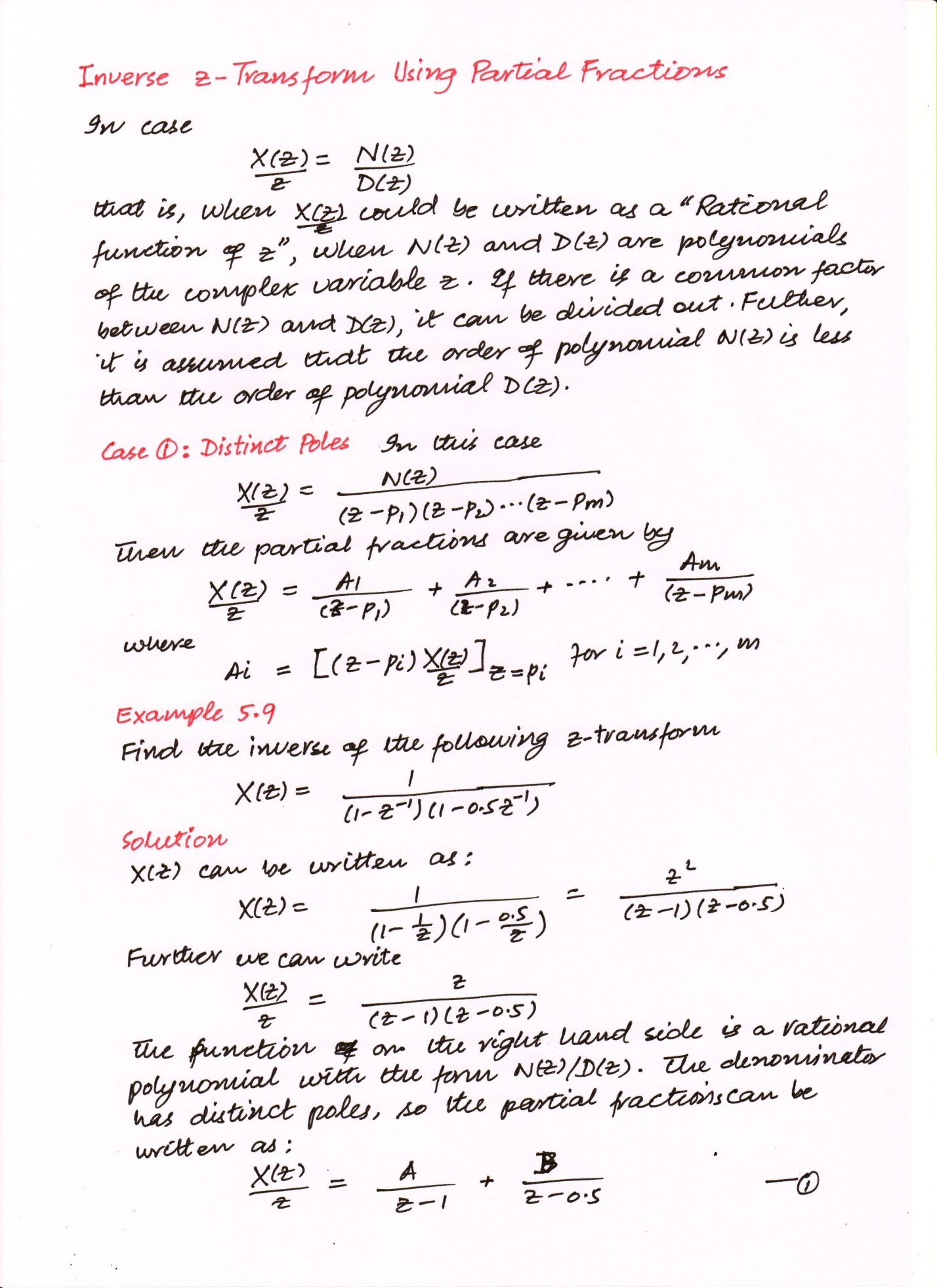
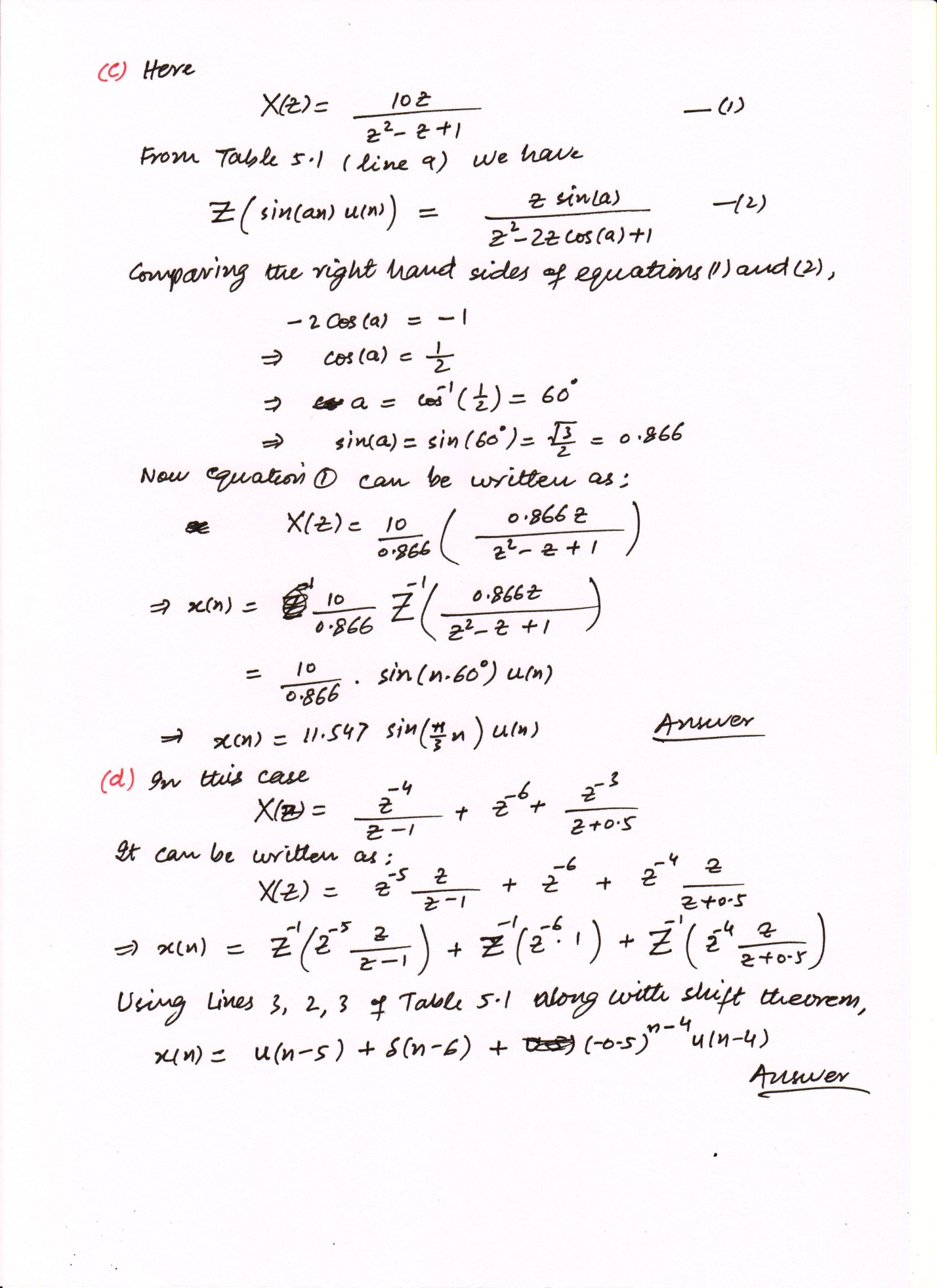
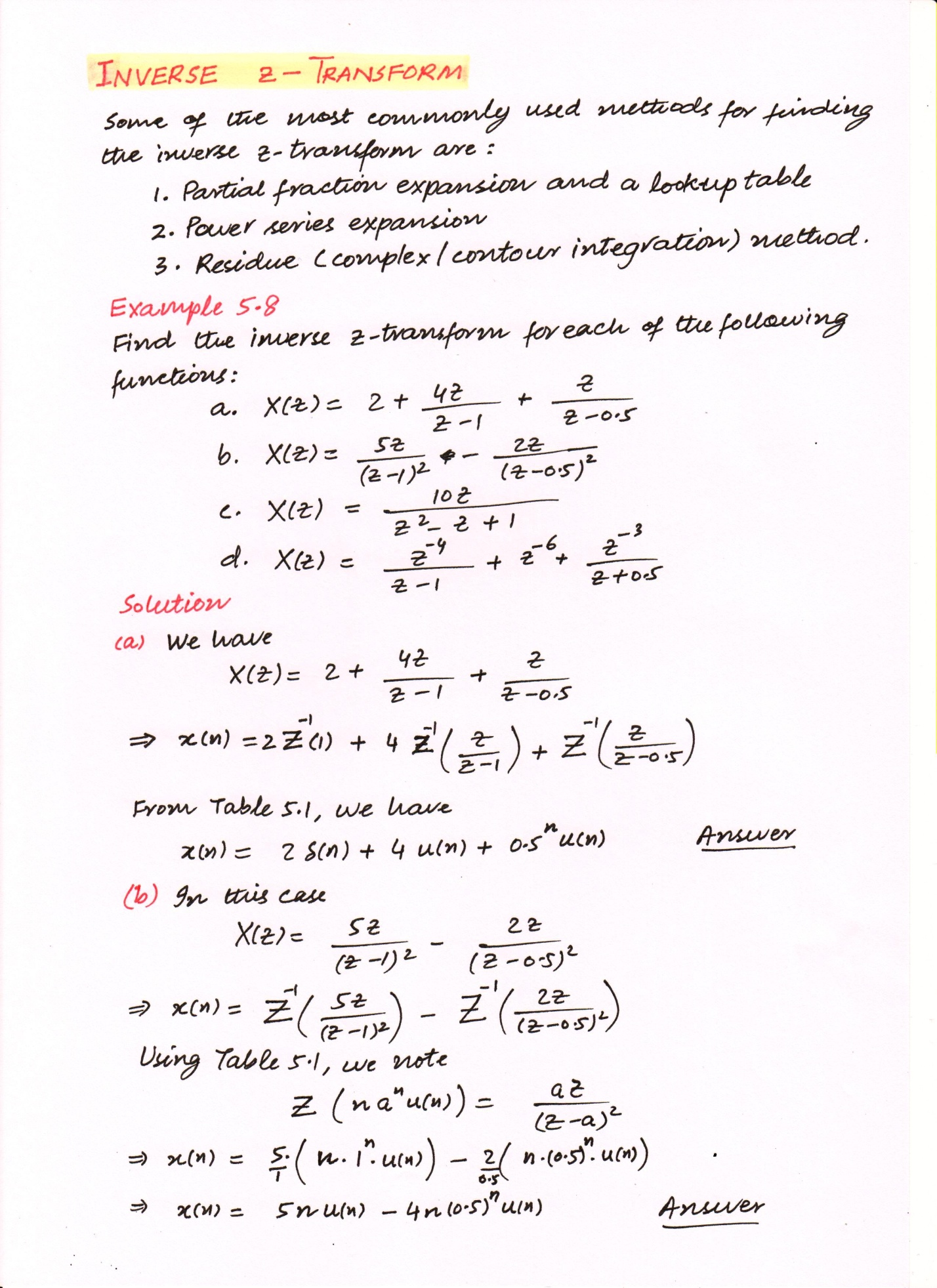
**Table 5.1 Table of z-transform pairs**

|  |  |  |  |
| --- | --- | --- | --- |
| Line No. | Signal | z-Transform | Region of Convergence |
| 1 |  |  |  |
| 2 |  | **1** | **Entire z-plane** |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |
| 6 |  |  |  |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |
| 11 |  |  |  |
| 12 |  |  |  |
| 13 |  |  |  |
| 14 |  |  |  |
| 15 | **where and are complex constants defined by**  **,** |  |  |

**Partial Fraction Expansion using MATLAB**

The MATLAB function ‘residue’ can be used to determine the partial fractions of a z-transform function. The syntax is given as

**[R, P, K] = residue(B, A)**

The vectors B and A are made up the coefficients for the numerator and denominator polynomials and, respectively as

**Example 5.12**

Find the partial fraction expansion for each of the following z-transform functions:

**Solution**

**Part(a) :** In this case we have

Multiplying both numerator and denominator by we get,

This can also be written as

Using MATLAB function ‘conv’, we have

>> conv([1 -1],[1 -0.5])

ans =

1.0000 -1.5000 0.5000

Therefore,

|  |
| --- |
| MATLAB |
| >> conv([1 -1],[1 -0.5])  ans =  1.0000 -1.5000 0.5000 |

Now we can use MATLAB command ‘residue’ to find out the partial fractions

|  |
| --- |
| MATLAB |
| >> [R, P, K] = residue([1 0],[1 -1.5 0.5])  R =  2  -1  P =  1.0000  0.5000  K =  [] |

Therefore,

Or

**Part(b) :** In this case we have

This can also be written as

Using MATLAB function ‘conv’, we have

>> conv([1 -1],[1 -1 0.5])

ans =

1.0000 -2.0000 1.5000 -0.5000

Therefore,

|  |
| --- |
| MATLAB |
| >> conv([1 -1],[1 -1 0.5])  ans =  1.0000 -2.0000 1.5000 -0.5000 |

Now we can use MATLAB command ‘residue’ to find out the partial fractions

|  |
| --- |
| MATLAB |
| >> [R, P, K] = residue([1 1 0],[1 -2 1.5 -0.5])  R =  4.0000  -1.5000 - 0.5000i  -1.5000 + 0.5000i  P =  1.0000  0.5000 + 0.5000i  0.5000 - 0.5000i  K =  [] |

Therefore,

Or

**Part(c) :** In this case we have

This can also be written as

Using MATLAB function ‘conv’, we have

>> conv(conv([1 -1],[1 -0.5]),[1 -0.5])

ans =

1.0000 -2.0000 1.2500 -0.2500

Therefore,

|  |
| --- |
| MATLAB |
| >> conv([1 -1],[1 -1 0.5])  ans =  1.0000 -2.0000 1.2500 -0.2500 |

Now we can use MATLAB command ‘residue’ to find out the partial fractions

|  |
| --- |
| MATLAB |
| >> [R, P, K] = residue([1 0],[1 -2 1.25 -0.25])  R =  4.0000  -4.0000  -1.0000  P =  1.0000  0.5000  0.5000  K =  [] |

Therefore,

Or