```
solution 1 : [10.517010768605466, 17.986376462311505, 8.657868155221287, -17.265866145192035, -18.097551971271315]
fitness of solution 1 : 20.700031097775476
solution 2 : [-16.06939371922859, -28.58937599333416, 26.844750590205237, 17.871216041351964, 7.993115642000539]
fitness of solution 2 : 20.823737334449664
solution 3 : [18.849834317987117, 22.362767096460473, 23.494517957689105, 12.013758469066822, -30.79223686908438]
fitness of solution 3 : 21.44995779006582
solution 4 : [-29.57168309000768, 1.6658575941773677, -3.3109395878003127, 19.476778800206226, 25.561749632123707]
fitness of solution 4 : 21.843777441873407
solution 5 : [18.954081420805956, 21.443664291275603, 6.013337221006154, 13.783988741309791, -5.0751873510539305]
fitness of solution 5 : 20.11933307999114
solution 6 : [30.123161383562667, 14.93349602674816, -15.986470910516676, 1.0954026165317714, -25.382121264485118]
fitness of solution 6 : 20.64271550936017
solution 7 : [1.5800787478814016, -11.16785792437775, 8.184278520502303, 30.23332212553771, 30.557052745718075]
fitness of solution 7 : 21.517039625507135
solution 8 : [-11.240861961412264, -7.878779454201641, 15.56057483528079, -23.191820724729922, -18.314889273375627]
fitness of solution 8 : 20.963478218933524
solution 9 : [-11.760272828711699, 11.95813492291019, -16.393348891271017, 24.2035880424477, 1.8250229405817322]
fitness of solution 9 : 20.522674273005702
solution 10 : [25.058431082663482, -28.948480370182203, 31.240585162974284, 16.005017293352417, -29.200656214710456]
fitness of solution 10 : 20.707694539736103
```

```
Selected Parents:
Selected_parent 1 : [18.849834317987117, 22.362767096460473, 23.494517957689105, 12.013758469066822, -30.79223686908438]
fitness of Selected_parent 1 : 21.44995779006582
Selected_parent 2 : [-11.240861961412264, -7.878779454201641, 15.56057483528079, -23.191820724729922, -18.314889273375627]
fitness of Selected_parent 2 : 20.963478218933524

After Recombination:
baby 1 : [18.849834317987117, 22.362767096460473, 15.56057483528079, -23.191820724729922, -18.314889273375627]
fitness of baby 1 : 21.527461561551764
baby 2 : [18.849834317987117, 22.362767096460473, 23.494517957689105, -23.191820724729922, -30.79223686908438]
fitness of baby 2 : 21.640385745840415

After Mutation:
Mutated_baby 1 : [18.849834317987117, 22.362767096460473, 15.56057483528079, -18.314889273375627, -23.191820724729922]
fitness of Mutated_baby 1 : 21.527461561551764
Mutated_baby 2 : [18.849834317987117, 22.362767096460473, -23.191820724729922, 23.494517957689105, -30.79223686908438]
fitness of Mutated_baby 2 : 21.640385745840415
```

Write a short observation on the fitness values after the recombination operator and after the mutation operator. Concentrate your discussion on whether there was improvement in the new solutions generated. Please write between 3-5 sentences only.

According to the shown values, after recombination, both babies showed slightly higher fitness values as compared to their respective selected parents. Thus, indicating a slight improvement. However, after mutation, the lack of improvements in fitness has been observed as shown in the values of both mutated babies remaining the same as before mutation. Therefore, the values entail that the operation of mutation in this program failed to deliver a better solutions.