In this thesis, we considered the problem of scheduling n jobs on a single machine. The aim of this study is to find the optimal and near optimal solutions for the sum of cost of total flow time and maximum late work with unequal ready time, this problem denoted by $1/rj \sum Fj + Vmax\ n\ j=1/$. The problem is strongly NP-hard, the branch and bound method was using to find optimal solution. Two lower bounds (LB1, LB2) are proposed each of them based on decompose the problem into two sub problems. The lower bounds of the problem is the sum of the lower bounds of the two sub problems. A heuristic which gives an upper bound in the root node of BAB algorithm was proposed, its effective in finding an optimal or near optimal schedule. Also, we proved some special cases of the problem which lead to optimal solution, three dominance rules were stated and proved. The results of extensive computational tests show that the proposed BAB algorithm is effective in solving problems up to (35) jobs at a time less than or equal to (30) minutes. We apply two local search methods to find near optimal solutions: Artificial Fish Swarm Algorithm (AFSA) and Fruit Fly Optimization Algorithm (FOA) . Computational experience found that these local search methods can solve the problem up to (6000) jobs with reasonable time, also found that: The AFSA has better results for the problem of size less than or equal to (35) jobs, but for the problems of size larger than (35) jobs, The FOA has the best results. All methods used in this research are programmed by using a programming language (MATLAB Language