

Problem 1: (Olympic Bike)

Olympic Bike is introducing two new lightweight bicycle frames, the Deluxe and the Professional, to be made from special aluminium and steel alloys. The anticipated unit profits are \$10 for the Deluxe and \$15 for the Professional. The number of pounds of each alloy needed per frame is summarized below. A supplier delivers 100 pounds of the aluminium alloy and 80 pounds of the steel alloy weekly.

	Aluminium Alloy	Steel Alloy
Deluxe	2	3
Professional	4	2

1. Formulate the problem
2. How many Deluxe and Professional frames should Olympic produce each week?
3. Suppose the profit on deluxe frames is increased to \$20. Is the above solution still optimal? What is the value of the objective function when this unit profit is increased to \$20?
4. If the unit profit on deluxe frames were \$6 instead of \$10, would the optimal solution change?
5. If simultaneously the profit on Deluxe frames was raised to \$16 and the profit on Professional frames was raised to \$17, would the current solution be optimal?
6. Olympic Bikes is considering producing a new frame, the Tour Master. Each frame of the Tour Master requires 3 pounds of steel alloy and 3 pounds of aluminium alloy. What is the minimum unit profit which would make it worthwhile producing the Tour Master?
7. Model the problem using Python and answer again sections 2 through 5.