Jack, an Industrial Engineering student, is running a small business out of his neighbor’s garage. Jack’s product is an automated gumball dispensing machine, although there are two versions: compact and deluxe. Jack is trying to determine the product mix to produce (i.e., the amount of each version of the product to be made) each month to maximize his profit. The deluxe model generates a profit of $50 for each unit, after considering material, labor, and other costs, while the compact model has a $15 profit. Unfortunately, the deluxe model requires 2 hours of assembly time while the compact model can be assembled in 30 minutes. Furthermore, the deluxe model requires 5 pounds of polybicarbonate per unit while the compact model only requires 1.5 pounds. Since Jack is still a student, he is only able to work on production for 4 hours each day, and he averages 25 working days per month. The polybicarbonate production is limited to 12 pounds per working day. Last semester Jack took a marketing class and determined during his market analysis project that the market for automated gumball machines is limited. Without additional advertising (which is impossible since spring break is coming up!), the market for the deluxe model is limited to 50 units per month while the market for compact models is no more than 200 units per month. Develop a formulation to help Jack determine the best monthly product mix. Clearly define the decision variables, objective, and constraints. Briefly state the purpose of each constraint.