**IE 260 CLASS EXERCISES - WEEK 3**

1. The student chapter of the American Society of Mechanical Engineers is planning a six-day trip to the national conference in Albany, NY. For transportation, the group will rent a car from either the State Tech Motor Pool or a local car dealer. The Motor Pool charges $0.36 per mile, has no daily fee, and pays for the gas. The local car dealer charges $30 per day and $0.20 per mile, but the group must pay for the gas. The car’s fuel rating is 20 miles per gallon, and the price of gas is estimated to be $2.00 per gallon.
   1. At what point, in miles, is the cost of both options equal?
   2. The car dealer has offered a special student discount and will give the students 100 free miles per day. What is the new breakeven point?
   3. Suppose now that the Motor Pool reduces its allinclusive rate to $0.34 per mile and that the car dealer increases the rate to $30 per day and $0.28 per mile. In this case, the car dealer wants to encourage student business, so he offers 900 free miles for the entire sixday trip. He claims that if more than 750 miles are driven, students will come out ahead with one of his rental cars. If the students anticipate driving 2,000 miles (total), from whom should they rent a car? Is the car dealer’s claim entirely correct?
2. Two alternative designs are under consideration for a tapered fastening pin. The fastening pins are sold for $0.70 each. Either design will serve equally well and will involve the same material and manufacturing cost except for the lathe and drill operations. Design A will require 16 hours of lathe time and 4.5 hours of drill time per 1,000 units. Design B will require 7 hours of lathe time and 12 hours of drill time per 1,000 units. The variable operating cost of the lathe, including labor, is $18.60 per hour. The variable operating cost of the drill, including labor, is $16.90 per hour. Finally, there is a sunk cost of $5,000 for Design A and $9,000 for Design B due to obsolete tooling.
   1. Which design should be adopted if 125,000 units are sold each year?
   2. What is the annual saving over the other design?