4301 A, 2019 Fall, HW 1, Due: 8/27

1. (60) Please type or print your answer the questions below concisely (50 words max for each question, 10 points each).
   1. What is the objective most supply chain engineers and managers try to optimize? Please use an example to illustrate this single objective is often sufficient.
   2. Other than the objective above, what can be other important objectives in collaboration with supply chain partners and compete with competitors?
   3. Please give one example in which financial objective is insufficient to help human beings.
   4. What does triple bottom line objective include?
   5. Please give an example scarce resource and one of natural resource scarcity in US today and an example of product that are in abundance.
   6. How would you define sustainability (you do not have to agree with me)?
2. (40) A firm invests to make gears for wind turbines. It can invest in a traditional gear machine at an annual cost of $30,000 per year. The incremental cost is $60/gear. The annual maximum production capacity is 1,000. The demand is estimated to be between 600 and 1200 per year. If the demand exceeds production capacity, it will run over time at an extra cost of $20 per gear.
   1. (20) Please find and plot the total cost, average cost and marginal cost as a function of the production or demand.
   2. (10) The firm can also invest in a computer numerical controlled machine at $40,000/year. The incremental cost for each gear is $50 per piece. The annual maximum capacity is 1,500. It can also produce more gear types. Please repeat the above.
   3. (10) What should the firm do and why (please make assumptions if necessary).