

ISyE 3104 Fall08
Homework 7 (30 points)
Due October 16, 2008

1) (24 Points) Bacchus warehouse of wine distributor stocks materials required for the cases of wines. One type of wine that Bacchus distributes is the Turkish wine Yakut. Each case of this wine is purchased by the warehouse for \$200. Since it is sent from Europe in intermodal containers it has a high lead time of 2 months (1/6 years) and the company uses an inventory carrying charge based on a 20% annual interest rate. The cost of order processing and receipt is \$1000 per order. Annual demand for this wine follows a normal distribution with mean 240 and standard deviation of 24.495. Assume that if a case of wine is demanded when the warehouse is out of stock, then the demand is backordered, and the cost associated with each backordered case is \$80.

- a) **(2 Points)** Compute the mean and standard deviation of demand during lead time.
- b) **(8 Points)** The manager of the warehouse uses (Q,R) policy. Find the optimal values of the order quantity and the reorder level.
- c) **(2 Points)** Determine the safety stock.
- d) **(4 Points)** What are the average annual holding, setup and penalty costs associated with this wine?
- e) **(4 Points)** What is the cost of uncertainty? (You may compare to a case that there is no uncertainty, think about what this case refers to)
- f) **(2 Points)** What is the proportion of order cycles in which no stock-outs occur?
- g) **(2 Points)** What is the proportion of demand that is unmet?

2) (6 Points) Read the article “Warehouse design eliminates slim pickings” by C. Cross, Industrial Engineers, October 2006, Pages 48-49.

- a) What kind of data/information did the researchers collect during their site visits? What was their most significant find?
- b) What are the basic assumptions and drawbacks of the conventional designs?
- c) Why does the “cross aisle model” reduce the picking costs?