Additional Problems on Stochastic Inventory Models

28. An artist's supply shop stocks a variety of different items to satisfy the needs of both amateur and professional artists. In each case described, what is the appropriate inventory control model that the store should use to manage the replenishment of the item described? Choose your answer from the following list and be sure to explain your answer in each case:

Simple EOQ	Newsvendor model with service level
Finite production rate	(Q, R) model with stock-out cost
EOQ with quantity discounts	(Q, R) model with Type 1 service level
Resource-constrained EOQ	(Q, R) model with Type 2 service level
Newsvendor model	Other type of model

   a. A highly volatile paint thinner is ordered once every three months. Cans not sold during the three-month period are discarded. The demand for the paint thinner exhibits considerable variation from one three-month period to the next.

   b. A white oil-base paint sells at a fairly regular rate of 600 tubes per month and requires a six-week order lead time. The paint store buys the paint for $1.20 per tube.

   c. Burnt sienna oil paint does not sell as regularly or as heavily as the white. Sales of the burnt sienna vary considerably from one month to the next. The useful lifetime of the paint is about two years, but the store sells almost all the paint prior to the two-year limit.

   d. Synthetic paint brushes are purchased from an East Coast supplier who charges $1.60 for each brush in orders of under 100 and $1.30 for each brush in orders of 100 or greater. The store sells the brushes at a fairly steady rate of 40 per month for $2.80 each.

   e. Camel hair brushes are purchased from the supplier of part (*d*), who offers a discount schedule similar to the one for the synthetic brushes. The camel hair brushes, however, exhibit considerable sales variation from month to month.

29. Annual demand for number 2 pencils at the campus store is normally distributed with mean 1,000 and standard deviation 250. The store purchases the pencils for 6 cents each and sells them for 20 cents each. There is a two-month lead time from the initiation to the receipt of an order. The store accountant estimates that the cost in employee time for performing the necessary paperwork to initiate and receive an order is $20, and recommends a 22 percent annual interest rate for determining holding cost. The cost of a stock-out is the cost of lost profit plus an additional 20 cents per pencil, which represents the cost of loss of goodwill.

   a. Find the optimal value of the reorder point R assuming that the lot size used is the EOQ.

   b. Find the simultaneous optimal values of Q and R.

   c. Compare the average annual holding, setup, and stock-out costs of the policies determined in parts (*a*) and (*b*).

   d. What is the safety stock for this item at the optimal solution?