

Assignment 8 - Due Sunday March 15th

1. (H&L 19.6–11.) The campus bookstore must decide how many textbooks to order for a course that will be offered only once. The number of students who will take the course is a random variable  $D$ , whose distribution can be approximated by a (continuous) uniform distribution on the interval  $[40, 60]$ . After the quarter starts, the value of  $D$  become known. If  $D$  exceeds the number of books available, the known shortfall is made up by placing a rush order at a cost of \$14 plus \$2 per book over the normal ordering cost. If  $D$  is less than the stock on hand, the extra books are returned for their original ordering cost less \$1 each. What is the order quantity that minimizes the expected cost?
2. (H&L 19.6–12.) Consider the following inventory model, which is a single-period model with known density of demand  $\varphi_D(\xi) = e^{-\xi}$  for  $\xi \geq 0$  and  $\varphi_D(\xi) = 0$  elsewhere. There are two costs connected with the model. The first is the purchase cost, given by  $c(y - x)$ . The second is a cost  $p$  that is incurred once if there is *any* unsatisfied demand (independent of the amount of unsatisfied demand).
  - (a) If  $x$  units are available and goods are ordered to bring the inventory level up to  $y$  (if  $x < y$ ), write the expression for the expected loss and describe completely the optimal policy.
  - (b) If a fixed cost  $K$  is also incurred whenever an order is placed, describe the optimal policy.
3. Suppose that you hold an American option that expires in 4 days. The current price of the underlying stock is \$14. Each day, the stock price goes up by \$1 with probability 0.5 and down by \$1 with probability 0.5. The option gives you the right, at the end of each day, to buy the stock for \$15. What is the current expected value of the option to you, assuming that you optimally exercise the option over the next 4 days.