

IE 221
OPERATIONS RESEARCH - PROBABILISTIC MODELS
EXAM 1 FALL 1998

- 1 ... A chemical is used in a manufacturing process and must be ordered and stored until used. The shelf life of 1 month can be doubled using a better storage facility, but the holding cost is doubled as a result. With the following data, determine the optimal order quantity and whether the better storage facility should be used.

$$K = \$80 \quad h = \$3/\text{gal.-yr.} \quad D = 5000 \text{ gal./yr.}$$

- 2 ... At the beginning of each month, a financial officer must decide how much of \$100,000 he intends to invest at 24% annual interest. What is not invested earns no interest and is used to cover expenses during the month. If expenses are more than what was withheld, an amount sufficient to cover expenses is withdrawn from the amount that was invested. Interest is forfeited for the amount withdrawn and there is an additional penalty of 4% of the withdrawn amount assessed. Monthly expenses are distributed according to a Normal distribution with a mean of \$6000 and standard deviation of \$2000. Determine the optimal amount that the financial officer should invest each month.

- 3 ... Consider the following data:

$$K = \$200 \quad h = \$10/\text{unit-yr.} \quad c(B) = \$100/\text{unit short} \quad R = 1 \text{ mo.} \quad L = 1 \text{ mo.}$$

Annual demand is Normally distributed with mean = 600 and st. dev. = 400

- (a) Determine the optimal order-up-to-level, S .
- (b) If the leadtime is Normally distributed with variance = .8, determine a new S and the *additional* safety stock cost over that associated with part (a).
- (c) Determine whether $SLM(1) = .99$ would provide better protection against stocking out than the policy found in part (a).