Inventory Formulas

Basic EOQ

$$Q_0 = \sqrt{\frac{2DS}{H}}$$

$$TC = \frac{Q}{2} * H + \frac{D}{Q} * S + [P * D]$$

EOQ with Quantity Discount

$$TC = \frac{Q}{2} * H + \frac{D}{Q} * S + P * D$$

Economic Run Size

$$ERS = \sqrt{\frac{2DS}{H}} * \sqrt{\frac{P}{P-U}}$$

$$I_{Max} = ERS * (\frac{P-U}{P})$$

$$TC = \frac{I_{Max}}{2} * H + \frac{D}{Q} * S + [P * D]$$

Reorder Point

Constant demand, Lead time

$$ROP = d * LT$$

Demand variable

$$ROP = d * LT + Z_{SL} * \sqrt{LT} * \sigma_d$$

Lead Time variable

$$ROP = d * LT + Z_{SL} * d * \sigma_{LT}$$

Demand & Lead Time Variable

$$ROP = d * LT + Z_{SL} * \sqrt{LT * \sigma_d^2 + d^2 * \sigma_{LT}^2}$$

ROP Shortages

Units short per cycle

$$E_{(n)} = E_{(Z)} * \sigma_{dLT}$$

Units short per year

$$E_{(N)} = E_{(n)} * \frac{D}{Q}$$

Annual Service Level

$$SL_{Annual} = 1 - \frac{E_{(n)}}{D}$$

note: the expression for σ_{dLT} is the same as those used for ROP, and depends on whether demand and/or lead time vary.

Fixed Interval

Assuming variable d, LT constant

$$Q = d * (OI + LT) + Z_{SL} * \sqrt{(OI + LT)} * \sigma_d - A$$

Single Period

$$Q = d + Z_{SL} * \sigma_d$$

$$SL = \frac{C_S}{C_S + C_e}$$

RJB,