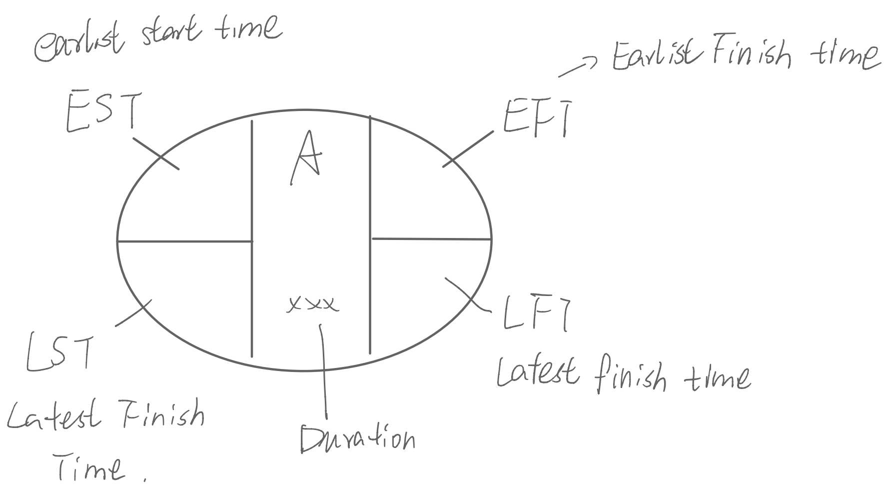


- **Statistical analysis is another option and requires three estimates of activity times**

  统计分析是另一种选择，需要对活动时间进行三次估算

  1. **Optimistic time (*a*)** 乐观情况的时间
  2. **Most likely time (*m*)** 最有可能的时间
  3. **Pessimistic time (*b*)** 悲观情况的时间

a<b m in the middle of a&b.

- **The mean of the beta distribution can be estimated by**

expected time

$$t_e = \frac{a + 4m + b}{6}$$

- **The variance of the beta distribution for each activity is**

$$\sigma^2 = \left(\frac{b - a}{6}\right)^2$$

- **Using the *z*-transformation**

要求完成的日期 → due day

$$z = \frac{T - T_E}{\sqrt{\sigma^2}}$$

→ critical path 的时间

能按期完成的%

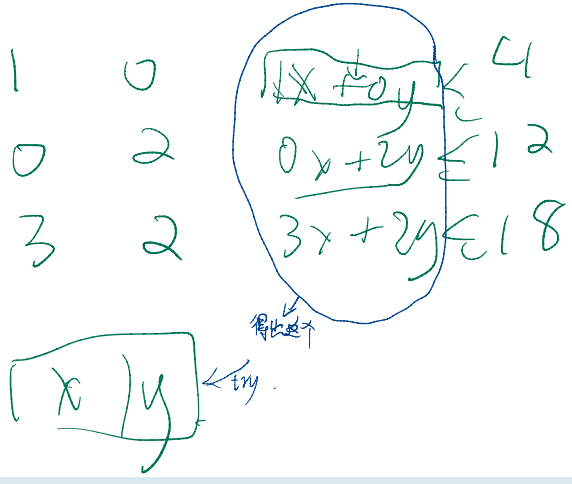
where

T **= due date for the project**

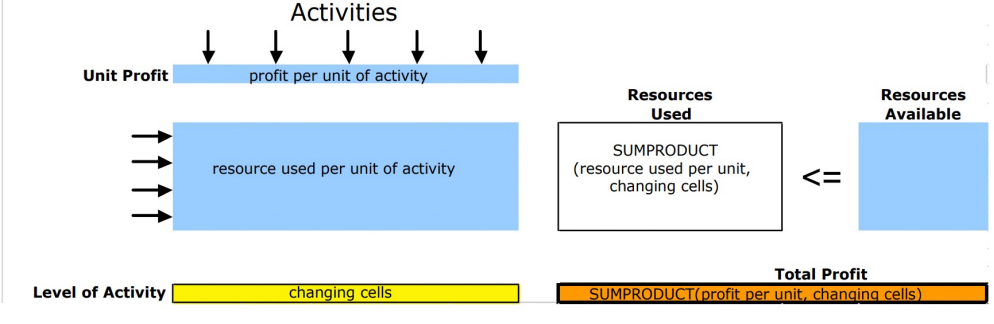
Monitoring and Controlling Projects

- **Tracking systems collect information on three topics**
  - **Open issues that require resolution**
  - **Risks that might delay the project completion**
  - **Schedule status periodically monitors slack time to identify activities that are behind schedule**

Excel Session 6 LP Part 1



Input LP Model Data into Excel and then use Solver



Time series forecasting 时间序列预测

Extrapolation 外推法

Regression analysis：用Independent variable –>dependent variable

Biased —Error. Unbiased—Correct!!

MSE—Mean squared error (让大错误显现)

MAE—Mean absolute Error (对于所有错误一样)

MAPE—Mean absolute percentage error (不受单位影响)

FEt= forecasting error in t= forecasting for t– actual value for t

预测方法

1. Naive forecasting method = y^t +1 = yt 上一年actual值.
2. Moving average forecasting method = y^t +1 = Average (yt, yt–1,yt–2 ….)
3. Exponential smoothing:
   - Smoothing Parameter 平滑参数 α
4. Double exponential smoothing:

week 9

Flow time $T = I/R$

Turns $= R/I$

R → Flow rate → cost! 在一段时间里的 cost.

Stockout 缺货.

Obsolescence Cost 过时成本 – 随着时间推移而失去价值的成本.

Opportunity cost → 未赚取的钱

Inventory Storage cost → 储存保护的花的钱

COGS = cost of Sales.

Inventory holding cost (as a% of COGS) = $\frac{\text{Annual holding cost percentage}}{\text{Annual turns}}$

Average inventory during the unit of time $= \frac{Q}{2}$ → Quantity → 我们买多少?

Holding cost / unit of time $= \frac{1}{2} \times h \times Q$

存货花费

h ↓ holding cost / unit

# of orders / unit of time $= \frac{R}{Q}$

R → demand rate

Q → 一次 order 货品数量

需 n 次 order?

order cost / unit of time $= k \times \frac{R}{Q}$.

k ↓ 运费

$\frac{R}{Q}$ ↓ # of order.

Total ordering & holding cost / unit of time

$$= C(Q) = \left(k \times \frac{R}{Q}\right) + \left(\frac{1}{2} \times h \times Q\right)$$

Economic order Quantity $= Q^* = \sqrt{\frac{2 \times k \times R}{h}}$.

划算的 order 数量.