

# ILG "SPEED DEMON" (NETWORK ROUTERS)

2 YEAR PLANNING HORIZON  
\$2,000,000 TO INVEST IN  
PRODUCTION AND MARKETING

$x_1$  = \$ INVESTED IN PRODUCTION, YEAR 1  
 $x_2$  = " " " YEAR 2

PROD CAPACITY, YEAR 1  $C_1 = \frac{x_1}{200} + \sqrt{x_1}$  ~~K~~  
" " YEAR 2  $C_2 = C_1 + 1.3 \left( \frac{x_2}{200} + \sqrt{x_2} \right)$   
INITIAL CAPACITY  $\uparrow$   $\uparrow$  CATCH-UP TO INCREASE IN YEAR 2

$y_1$  = \$ INVESTED IN MARKETING, YEAR 1  
 $y_2$  = " " " YEAR 2

DEMAND IN YEAR 1  $d_1 = 4000 + \frac{y_1}{400}$   
" "  $d_2 = \underline{.75}d_1 + \frac{y_2}{300}$

PROFIT PER UNIT SOLD \$600 YEAR 1  
\$50 YEAR 2

MAXIMIZE PROFIT

SUBJECT TO BUDGET CONSTRAINT  
\$2,000,000 AVAILABLE

- YEAR 1 PRODUCTION IN EXCESS OF YEAR 1 DEMAND IS WORTHLESS
- YEAR 1 PROFIT CAN BE INVESTED IN PRODUCTION/ MARKETING FOR YEAR 2

YOUR ASSIGNMENT:

FORMULATE AND SOLVE THIS

(P:50)



PROD:  $x_1, x_2 \rightarrow c_1, c_2$

MARKET:  $y_1, y_2 \rightarrow d_1, d_2$

SALES  $z_1, z_2$  START IN YEAR 1, 2

NOTE  
 $c_1, c_2$   
 CANNOT EXCEED  
 IN YEAR 1, 2  
 $z_1 \leq c_1, z_1 \leq d_1$   
 $z_2 \leq c_2, z_2 \leq d_2$

[SALES CANNOT EXCEED PRODUCTION CAPACITY OR DEMAND]

EXPENSES:

$$x_1 + y_1 \leq 2,000,000$$

$$x_2 + y_2 \leq \boxed{2,000,000 - (x_1 + y_1)}$$

LEFTOVER  
YEAR 1

$$+ \text{POV } z_1$$

RE-INVESTING  
YEAR 1 PROFIT

$$\begin{aligned} \underline{\text{MAX}} \quad & \underline{2,000,000} + \text{POV } z_1 + \text{PTO } z_2 \\ & - (x_1 + y_1 + x_2 + y_2) \\ & - 2,000,000 \end{aligned}$$