

SOM 466
R GUNTHER

HOMEWORK SOLUTIONS SET # 3

1. a. $\text{PAYBACK PERIOD} = \frac{600,000}{300,000} = \underline{2 \text{ YRS}}$

b. $\frac{\text{NET MEAN}}{\text{RATE OF RETURN}} = \frac{150,000}{600,000} = \underline{25\%}$

WHERE $(1,200,000 - 600,000)/4 = 150,000$

c. $\text{NET PRESENT VALUE} = -600,000 + (300,000)(3.312) = \underline{393,600}$

d. $\text{PROFITABILITY INDEX} = \frac{393,600}{600,000} = \underline{.656}$

2 a. $\text{PAYBACK PERIOD} = \frac{400,000}{200,000} = \underline{2 \text{ YRS}}$
(SAME)

b. $\text{NET MEAN RATE OF RETURN} = \frac{100,000}{400,000} = \underline{25\% \text{ (SAME)}}$
 $(800,000 - 400,000)/4 = 100,000$

c. $\text{NET PRESENT VALUE} = -400,000 + (200,000)(3.312) = \underline{262,400 \text{ (LESS)}}$

d. $\text{PROFITABILITY INDEX} = \frac{262,400}{400,000} = \underline{.656}$
(SAME)

PROJECT 2 IS
DOMINATED BY 1.

3.

2.

$$\text{MAX } Z = 10X_A + 10X_B + 5X_C + 5X_D + 8X_E$$

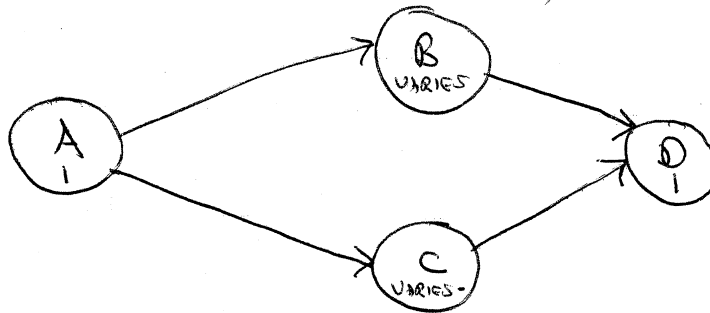
$$\text{ST. } 50,000X_A + 80,000X_B + 30,000X_C + 20,000X_D + 10,000X_E \leq 10,000$$

$$300X_A + 200X_B + 400X_C + 100X_D + 100X_E \leq 700$$

$$X_i = 0 \text{ OR } 1$$

THIS INTEGER PROGRAM CAN BE SOLVED WITH POM-QM FOR WINDOWS. ANSWER $X_A, X_D, X_E = 1$ & $X_B, X_C = 0$.

4.



CUMULATIVE PROBABILITIES:

ACTIVITY B:

ACTIVITY C:

PROB	TIME	COST
.3	1	\$ 1000
.7	2	2000
.9	3	3000
1.0	4	4000

PROB	TIME	COST
.2	1	\$ 2000
.4	2	3000
.7	3	4000
1.0	4	5000

3.

4. (CONT)

<u>B</u>			<u>C</u>			<u>PROJECT</u>	
<u>RN</u>	<u>TIME</u>	<u>COST</u>	<u>RN</u>	<u>TIME</u>	<u>COST</u>	<u>TIME</u>	<u>COST</u>
.34	2	\$2000	.93	4	\$5000	6	\$11,000
.23	1	1000	.11	1	2000	3	7,000
.76	3	3000	.35	2	3000	5	10,000
.55	2	2000	.42	3	4000	5	10,000
.20	1	1000	.00	4	5000	6	10,000

EXPECTED (AVERAGE) PROJECT TIME = 5.00
 EXPECTED COST = 9.60

DISTRIBUTIONS:

<u>TIME</u>		<u>COST</u>	
3	.2	7	.2
5	.4	10	.6
6	.4	11	.2

5.

LABOR : 1000 @ \$35 = \$ 35,000
 SHEETS : 2000 @ 2.50 = 5,000
 TAPE : 500 @ 2 = 1,000
 \$ 41,000 x 1.2 =
\$ 49,200 ↓ OVERHEAD.

4.

5. (CON'T).

MONTH	A(+)	E(+)	A(+)-E(+)	A(+)-E(+)
JAN.	39200	49200	-10000	10000
FEB.	59200	49200	+10000	10000
MAR.	39200	49200	-10000	10000
APRIL	69200	49200	20000	20000
			<u>\$10000</u>	<u>\$50000</u>

$$MAD = 50,000 \div 4 = 12,500$$

$$SD = (12,500)(.8) = 10,000$$

$$TS = 10,000 \div 12,500 = .8$$

6.

$$A = (4/4) \times (60/40) = 1.50$$

$$B = (3/2) \times (50/50) = 1.50$$

$$C = (2/3) \times (30/20) = 1.00$$

$$D = (1/1) \times (20/30) = 0.67$$

$$E = (2/4) \times (25/25) = 0.50$$

- THE MOST CONCERN SHOULD GO TO E, BEHIND SCHEDULE & USING UP ALLOCATED COST.
- D IS A PROBLEM, ON SCHEDULE BUT OVER BUDGET.
- A, B COULD BE PROBLEM S. WHY ARE THEY UNDER COST OR SCHEDULE?

5.

7. WE CAN USE THE CRITICAL RATIO BACKWARDS HERE!

$$CR \div \left(\frac{\text{BUDG. COST}}{\text{ACTUAL COST}} \right) = \left(\frac{\text{ACTUAL PROGRESS}}{\text{SCHEDULED PROGRESS}} \right)$$

$$\begin{aligned} A &= (1.0) \div (1.5) = 0.67 && \text{BEHIND} \\ B &= (0.5) \div (0.5) = 1.00 \\ C &= (1.5) \div (1.5) = 1.00 && \left. \begin{array}{l} B \\ C \end{array} \right\} \text{ON TIME} \\ D &= (1.5) \div (1.0) = 1.50 && \text{EARLY} \\ E &= (0.67) \div (1.0) = 0.67 && \text{BEHIND} \end{aligned}$$

8. EARNED VALUE = (% COMPLETED) (PLANNED COST)

$$\text{EARNED VALUE} = \left(\frac{\text{ACTUAL PROGRESS}}{\text{SCHEDULED PROGRESS}} \right) (100)$$

$$\text{CRITICAL RATIO (CR)} = \left(\frac{\text{ACTUAL PROGRESS}}{\text{SCHEDULED PROGRESS}} \right) \left(\frac{\text{BUDG. COST}}{\text{ACTUAL COST}} \right)$$

$$CR = \left(\frac{\text{EARNED VALUE}}{100} \right) \left(\frac{100}{\text{ACTUAL COST}} \right)$$

$$CR = (\text{EARNED VALUE}) / (\text{ACTUAL COST})$$

WE CAN USE FORMULA ABOVE TO COMPUTE CR FOR A & B OVER THE 6 DAYS:

G.

8. (CONT).

<u>DAY</u>	<u>CR: TEAM A</u>	<u>CR: TEAM B</u>
1	.947	.947
2	.939	.936
3	.931	.931
4	.925	.927
5	.897	.899
6	.889	.890

BOTH RATIOS ARE CLOSE TO ONE WHICH IS GOOD. HOWEVER, BOTH RATIOS ARE GETTING SMALLER, PRIMARILY BECAUSE OF COST INCREASES. NO SIGNIFICANT DIFFERENCE BETWEEN A & B. CRITICAL RATIOS.

A IS AHEAD OF SCHEDULE BUT IS ALSO COSTING MORE WHEN COMPARED WITH B.