

Deterministic Math Models (550.251)
CORRECTED! Homework 4 (Due Thursday, March 13, 2008)

General Directions: You must show all work and document any assumptions to receive full credit. You may use Excel unless otherwise stated, but please include an algebraic formulation of your model. When formulating models, make sure you define your variables and label all constraints.

1. QP Dolls, Inc. has developed a new doll it feels could turn into a “collectors item” through proper advertising on cable TV. The table below provides the details for this project.

ID	Activity	Predecessor	Duration	Budget
A	Conduct market analysis	–	6	\$240,000
B	Secure facilities/equipment	A	4	\$300,000
C	Hire manufacturing supervisor/foremen	A	3	\$150,000
D	Purchase manufacturing materials	B	3	\$540,000
E	Hire/train workers	B,C	10	\$900,000
F	Manufacture various prototypes	D,E	2	\$300,000
G	Complete full-scale production	F	6	\$1,350,000
H	Develop advertising campaign	B	6	\$450,000
I	Prepare cable TV informercials	F,H	8	\$1,050,000

- (a) Formulate and solve a linear program to minimize project’s duration.

Management is giving some thought to putting extra resources into the project so that it can be completed within one-half year (26 weeks). Accordingly, each work package has been studied, and a set of crash times in weeks and costs has been developed.

ID	Activity	Crash Time	Crash Cost
A	Conduct market analysis	5	\$300,000
B	Secure facilities/equipment	3	\$400,000
C	Hire manufacturing supervisor/foremen	2	\$240,000
D	Purchase manufacturing materials	2	\$750,000
E	Hire/train workers	7	\$1,440,000
F	Manufacture various prototypes	1	\$390,000
G	Complete full-scale production	4	\$3,200,000
H	Develop advertising campaign	3	\$900,000
I	Prepare cable TV informercials	4	\$2,600,000

- (b) Determine a schedule for the work packages which minimizes the total cost of completing the project within 26 weeks. What is the minimum total cost?

- (c) Suppose QP budgets \$6 million for this project. What is the minimum time to complete this project?
2. Winston & Albright: Problem 6.7.43
 3. Winston & Albright: Problem 6.7.46
 4. Winston & Albright: Problem 6.7.60(a)
 5. Winston & Albright: Problem 6.7.67
 6. (Extra Credit!) Winston & Albright: Problem 5.7.83.