

## FIT3158 Business decision modelling - S2 2022

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**Started on** Friday, 19 August 2022, 7:42 PM**State** Finished**Completed on** Friday, 19 August 2022, 7:57 PM**Time taken** 14 mins 43 secs**Grade** 0.70 out of 1.00 (70%)[Print friendly format](#)

## Question 1

Correct

Mark 0.10 out of 0.10

A company will be able to obtain a quantity discount on component parts for its four products,  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ , if it produces beyond certain limits. To get the  $X_1$  discount it must produce more than 50  $X_1$ 's. It must produce more than 60  $X_2$ 's for the  $X_2$  discount, 70  $X_3$ 's for the  $X_3$  discount and 80  $X_4$ 's for the  $X_4$  discount. How many binary variables are required in the formulation of this problem?

- ☐ a. 2
- ☐ b. 8
- ☒ c. 4
- ☐ d. 12



The correct answer is: 4

## Question 2

Correct

Mark 0.15 out of 0.15

A company is developing its weekly production plan. The company produces two products, A and B, which are processed in two departments. Setting up each batch of A requires \$90 of labour while setting up a batch of B costs \$60. Each unit of A generates a profit of \$30 while a unit of B earns a profit of \$25. The company can sell all the units it produces. The data for the problem are summarized below.

Operation	Hours required by		Hours
	A	B	
Cutting	5	4	92
Welding	4	1	48

The decision variables are defined as:

 $X_i$  = the amount of product  $i$  produced (where  $X_1$  = Product A,  $X_2$  = Product B) $Y_i$  = 1 if  $X_i > 0$  and 0 if  $X_i = 0$

What is the appropriate value for  $M_2$  in the linking constraint for product B?

- ☐ a. 48
- ☐ b. 4
- ☐ c. 1
- ☒ d. 23



The correct answer is: 23

### Question 3

Incorrect

Mark 0.00 out of 0.10

A company will be able to obtain a quantity discount on component parts for its four products,  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$ , if it produces beyond certain limits. To get the  $X_1$  discount it must produce more than 50  $X_1$ 's. It must produce more than 60  $X_2$ 's for the  $X_2$  discount, 70  $X_3$ 's for the  $X_3$  discount and 80  $X_4$ 's for the  $X_4$  discount. How many decision variables are required in the formulation of this problem?

- ☒ a. 16
- ☐ b. 12
- ☐ c. 4
- ☐ d. 8



The correct answer is: 12

### Question 4

Correct

Mark 0.15 out of 0.15

A company is developing its weekly production plan. The company produces two products, A and B, which are processed in two departments. Setting up each batch of A requires \$50 of labour while setting up a batch of B costs \$70. Each unit of A generates a profit of \$17 while a unit of B earns a profit of \$21. The company can sell all the units it produces.

The decision variables are defined as:

$X_i$  = the amount of product  $i$  produced (where  $X_1$  = Product A,  $X_2$  = Product B)

$Y_i$  = 1 if  $X_i > 0$  and 0 if  $X_i = 0$

What is the objective function for this problem?

- ☒ a. MAX:  $17 X_1 + 21 X_2 - 50 Y_1 - 70 Y_2$
- ☐ b. MIN:  $33 Y_1 + 49 Y_2$
- ☐ c. MIN:  $17 X_1 + 21 X_2 - 50 Y_1 - 70 Y_2$
- ☐ d. MAX:  $33 X_1 + 49 X_2$



The correct answer is: MAX:  $17 X_1 + 21 X_2 - 50 Y_1 - 70 Y_2$

### Question 5

Incorrect

Mark 0.00 out of 0.10

An ILP problem has 6 binary decision variables. How many possible integer solutions are there to this problem?

- ☐ a. 6
- ☒ b. 32
- ☐ c. 12
- ☐ d. 64



The correct answer is: 64

**Question 6**

Correct

Mark 0.10 out of 0.10

One approach to solving integer programming problems is to ignore the integrality conditions and solve the problem with continuous decision variables. This is referred to as:

- ☐ a. quickest solution method.
- ☐ b. LP satisficing.
- ☐ c. LP approximation.
- ☒ d. LP relaxation.



The correct answer is: LP relaxation.

**Question 7**

Incorrect

Mark 0.00 out of 0.10

For minimization problems, the optimal objective function value to the LP relaxation provides what for the optimal objective function value of the ILP problem?

- ☐ a. A lower bound.
- ☐ b. An alternative optimal solution.
- ☐ c. An additional constraint for the ILP problem.
- ☒ d. An upper bound.



The correct answer is: A lower bound.

**Question 8**

Correct

Mark 0.20 out of 0.20

A production company wants to ensure that if Product 2 is produced, production of Product 2 not exceed production of Product 1. Which of the following constraints enforce this condition?



- ☒ a.  $X_2 \leq X_1$
- ☐ b.  $X_2 \leq M_2 Y_2, X_2 \leq Y_2 X_1$
- ☐ c.  $X_2 \leq M_2 X_1$
- ☐ d.  $X_2 \geq M_2 Y_2$

The correct answer is:

$X_2 \leq X_1$

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