

LINEAR PROGRAMMING REVISION

QUESTION ONE

Abdullah makes and sells two types of hats: beanies and caps.

Abdullah can make a maximum of 45 hats per week.

He must make at least twice as many caps as beanies.

He can only make a maximum of 33 caps and needs to make a minimum of 5 beanies

Abdullah makes \$14 profit on a beanie and \$18 profit on a cap.

Calculate how many of each type of hat Abdullah should make each week in order to maximise his profit.

QUESTION TWO

Carmia's shop makes two types of chairs: chairs with wooden seats and chairs with soft seats.

	Number of each item made	Time to make each item (mins)	Cost of materials per item (\$)	Profit per item (\$)
Wooden seat	x	90	42	20
Soft seat	y	60	84	16

Carmia's shop can only work on making her chairs for a maximum of 120 hours per week

and can only afford to spend a total of \$6720 on materials to make the chairs.

She already has orders for 20 chairs with wooden seats and 48 chairs with soft seats.

Calculate how many of each type of seat Carmia should produce per week, in order to maximize her profit.

QUESTION THREE

An online electronics store is considering selling the *zPhones* and *zPods* from their website.

They have obtained the following information from the wholesale suppliers:

	<i>zPhones</i>	<i>zPods</i>
Minimum number of units to be ordered	200	400
Wholesale price per unit	\$600	\$200
Recommended selling price per unit	\$1000	\$400

The storage space required for each *zPhone* or *zPod* is the same, and currently the store only has space to store a maximum of 1000 units. They have a budget of \$320 000 to order the items.

The store originally decided to sell the *zPhones* and *zPods* for the recommended selling price. The income I (\$) is given by the equation $I = 1000x + 400y$

Calculate how many *zPhones* and *zPods* the store should order to maximise their income.

QUESTION FOUR

The *zTunes* online music store currently offers both songs and videos to download. They are considering how many more of each type they should buy so they can offer more variety for their customers.

Let x be the number of songs bought and y be the number of the videos bought.

Each song takes up 4 MB of storage, and each video takes up 20 MB of storage. *zTunes* has enough space on their server to store another 1400 MB of songs and videos.

There is demand from customers to support at least 50 new songs and at least 10 new videos being bought, and *zTunes* needs to buy at least twice as many songs as videos to meet the terms of their contracts with the music companies.

zTunes generates an income of \$2.00 for each song they sell and \$5.00 for each video they sell.

Calculate how many more songs and videos *zTunes* should buy to maximise their income.

QUESTION FIVE

A toy manufacturer makes two types of soft toys: Winnie the Pooh bears and Raggety AnN dolls. The cost of manufacturing a bear is \$30 and the cost of manufacturing a doll is \$35. The cost of manufacturing cannot exceed \$4 200. In order to make a profit, twice the number of bears plus the number of dolls cannot exceed 200.

The profit upon sale of the soft toys is \$10 per bear and \$8 per doll.

Calculate the number of bears and dolls that need to be manufactured in order to get maximum profit.

QUESTION SIX

A retailer for a music shop buys CDs and DVDs packed in cartons. The cost of a carton for CDs is \$75 and the cost of a carton for DVDs is \$200. He can only afford to spend up to \$30 000 on buying these CDs and DVDs and has room for only 200 cartons.

He makes a profit of \$100 on a carton of CDs and \$250 on a carton of DVDs. Calculate the number of cartons of CDs and DVDs that he needs to buy in order to make maximum profit