② DECISION VARIABLES

$x_c \in \mathbb{Z}$: # of furniture sets to be acquired
from Caroline Woodworks

similar for x_N, x_A, x_L.

$z_c \in \{0,1\}$: 1 if we purchase anything from
Caroline Woodworks; 0 otherwise

similar for $z_N, \cancel{z_A}, z_L$.

② OBJECTIVE FCT.

minimise $\quad 2{,}500\, x_c + 10{,}000\, z_c +$
$\dots$ €please don't do R&D in
assignments/exams!

③ CONSTRAINTS:

$x_c + x_N + x_A + x_L = 2{,}000$

$\boxed{x_c \leq 1{,}000 \quad, \quad x_c \leq M \cdot z_c}$

$\Downarrow$

$x_c \leq 1{,}000 \cdot z_c$

$x_N \leq 1{,}200 \cdot z_N$

$x_A \leq 800$

$x_L \leq 1{,}100 \cdot z_L$

$x_c, x_N, x_A, x_L \geq 0$

(6)   Delaware Mills:

cost

slope:
2,430

£7,000

slope:
2,530

£9,000

1000 1500   Purchase
                                      quantity

Delaware Mills "small"
x_S, z_S

Delaware Mills "big"
x_B, z_B
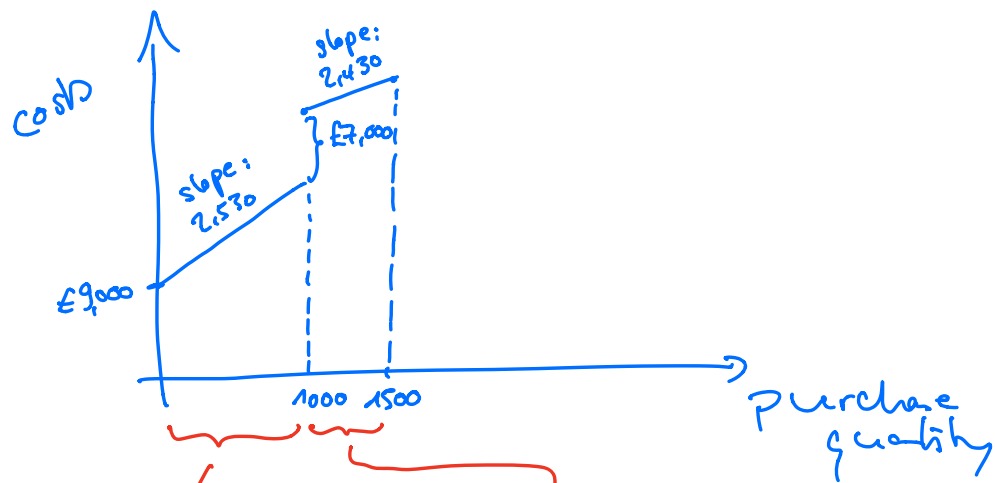
add to the objective function:
$$+ 9{,}000 \cdot z_S + 2{,}530\, x_S$$
$$+ 7{,}000 \cdot z_B + 2{,}430\, x_B$$

add the constraints:

$$x_S \leq 1{,}000\, z_S$$
$$x_B \leq 500\, z_B$$

$x_S, x_B \in \mathbb{Z},\ x_S, x_B \geq 0$
$z_S, z_B \in \{0, 1\}$

z_B is only allowed to be 1 if $x_S = 1{,}000$!

$$z_B \leq \frac{x_S}{1{,}000} \quad !$$