**Problem**

A small bakery produces two types of cakes: chocolate cakes and vanilla cakes. Each chocolate cake requires 1 cup of flour, 1 cup of sugar, and 1 egg. Each vanilla cake requires 1 cup of flour, 2 cups of sugar, and 2 eggs. The bakery has 8 cups of flour, 9 cups of sugar, and 8 eggs available. A chocolate cake sells for $6, and a vanilla cake sells for $13. The bakery wants to maximize its profit. How many chocolate cakes will it make?

**Solution**

Let x = number of chocolate cakes

Let y = number og vanilla cakes

Objective function:

Constraints:

Flour constraint: *x*+*y* ≤ 8

Sugar constraint: *x*+2*y* ≤ 9

Egg constraint: *x*+2*y* ≤ 8

Non-negativity constraint: *x* ≥ 0, *y* ≥ 0

The sugar and egg constraints are almost similar apart from that one has an upper limit of 9 and the other of 8. Therefore, we only need to select the one with the thighter upper limit which is the one with the 8:

*x*+*y* ≤ 8

*x*+2*y* ≤ 8

Finding the corner points:

For constraint 1:

For x = 0, y = 8

For y = 0, x = 8

The points are (0, 8) & (8, 0)

For constraint 2:

For x = 0, y = 4

For y = 0, x = 8

The points are (0, 4) & (8, 0)

Now remember that we have to select the corner points for the feasible region:

A screenshot of a graph

Description automatically generated

Figure 1. Feasible region (https://www.desmos.com/calculator)

And because x 0 and y 0 we are looking at quadrant 1.

We can tell the corner points are (0, 4) & (8, 0).

Hence:

Therefore, the bakery will make 0 chocolate cakes and 4 vanilla cakes. So, the answer is **0**.

**Answer: 0**