

2 Functions

Activity: Linear programming (Teacher version)

Homework problem: Ski manufacturing

- A sporting goods company manufactures two types of skis: a racing model and a freestyle model.
- Each pair of racing skis requires 3 hours of labour and the company produces at most 20 pairs of racing skis per day.
- Each pair of freestyle skis requires 2 hours of labour and the company can produce at most 30 pairs of freestyle skis per day.
- They have a maximum total of 90 hours available for ski production.
- The profit on each pair of racing skis is \$30 and \$40 on each pair of freestyle skis.



Question: How many pairs of each should be manufactured in order to maximise profits? Use problem solving and linear programming techniques to solve.

Let x = number of racing skis

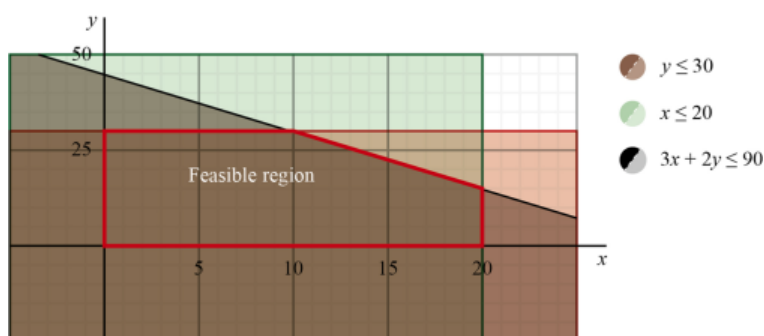
Let y = number of free skis

Constraints:

- $x \leq 20, y \leq 30$
- labour: $3x + 2y \leq 90$

Maximizing equation:

$$P = 30x + 40y$$



Vertices of feasible region (0,30), (10,30), (20,15), (20,0), (0,0) (no need to test all points)

x	y	Profit
0	10	400
10	30	1500
20	15	1200

So produce 10 pairs of racing skis and 30 pairs of free-style for a maximum profit of \$1500.

Additional question: Suppose that the profit on each pair of freestyle skis is \$20. Show that there are multiple ways to maximise profit.

x	y	Profit
0	10	200
10	30	900
20	15	900

Either 10 pairs of racing skis and 30 free style or 20 pairs of racing skis and 15 pairs of free style for \$900 profit.