

## 1 Part II

### 1.1 Problem 2

Marginal revenues  $MR = 100 - 2Q$

Marginal cost San Jose  $MC_{SJ} = 4q_{sj}$

Marginal cost Santa Cruz  $MC_{SC} = 6q_{sc}$

We know that a sufficient condition to produce in both plants is  $MR = MC_{SJ} = MC_{SC}$

working out the algebra, we get  $q_{sj} = 3/2q_{sc}$  and

$$\begin{aligned}100 - 2q_{sj} - 2q_{sc} &= 6q_{sc} \\100 - 3q_{sc} - 2q_{sc} &= 6q_{sc} \\100/11 &= q_{sc}\end{aligned}$$

Therefore,  $q_{sj} = 150/11$

For completeness we need to check if joint profits is higher than profits producing using one plant.

$$\pi_{BOTH} = 100 - 500/11 - 100 - 2 * (150/11)^2 - 3(100/11)^2$$

Notice that  $q_{SJ}^1 = 100/6$  and  $q_{SC}^1 = 100/8$

$$\pi_{SJ} = (100 - 100/6) * (100/6) - 75 - 2 * (100/6)^2$$

$$\pi_{SC} = (100 - 100/8) * (100/8) - 25 - 3 * (100/8)^2$$

comparing profits, we can check that it is optimal to produce ONLY in San Jose!