1. Consider a homogenous good market with the following market demand curve:

\[
q = 100 - p, \quad 0 \leq p \leq 100 \\
= 0, \quad p > 100.
\]

Two firms produce output at constant marginal cost = 10. Derive the Nash equilibrium outcome in terms of prices, outputs and the profits of the two firms under the following alternative situations.

(i) Firms engage in Bertrand price competition with no capacity constraints.
(ii) Firms engage in Bertrand price competition and each firm has a maximum production capacity = 15.
(iii) Firms engage in Cournot quantity competition (i.e., determine their capacity assuming that the price is such that market demand equals industry capacity).

In each case, you need to explain why this is a Nash equilibrium.

Compare the industry output in cases (i) and (iii) to the socially optimal and the monopoly output levels.

2. Consider a homogenous good market with the following market demand curve:

\[
q = 8 - p, \quad 0 \leq p \leq 8 \\
= 0, \quad p > 8.
\]

Two firms produce output at constant marginal cost which may differ between the two firms. \(c_1, c_2\) denote the unit costs of production of the two firms. Derive the Nash equilibrium outcome and the profits of the two firms under the following alternative situations.

(i) Firms engage in Bertrand price competition; \(c_1 = 0, c_2 = 5\).
(ii) Firms engage in Bertrand price competition; \(c_1 = 0, c_2 = 1\).

Use case (ii) to argue the role of potential competition in limiting market power & the problems of trying to identify market power by looking at how market shares are concentrated.