Problem 1

1. Demand: $P(q) = a - bq$
2. Cost: $C(q) = cq$
3. $b \sim logN(\mu, \sigma)$

The firm wishes to maximize it's expected profit. Solve for the optimal quantity analytically. Then write a computer program that returns the numerical optimal quantity given any input vector (a, b, c, μ, σ). You may use existing quadrature packages or write your own code for the integration.

Problem 2

1. Demand: $P(Q) = b\,Q^{-\gamma}$
2. Cost: $C_i(q_i) = \frac{1}{2}\,c_i\,q_i^2$
3. $b \sim logN(\mu, \sigma)$
4. i = 1,2
5. $Q = q_1 + q_2$

The firms' wish to maximize their expected profits. Solve for the set of first-order conditions analytically. Then write a computer program that solves for the optimal quantities given any input vector $(\gamma, c_1, c_2, \mu, \sigma)$ using:

1. Newton's method
2. Function iteration

You must code the two algorithms yourself and not use packages.