**Problem 3:**

a) For continuity, expression for 𝑥 ≤ 𝑎, should be evaluated on 𝑥 = 𝑎, and must be equated with the limit of the 𝑥 > 𝑎 expression near 𝑎;

𝜃1 + 𝜃2𝑥 + 𝜃3𝑥2 = 𝜃4 + 𝜃5 𝑥 + 𝜃6 𝑥2 ------------ (1)

Now, differentiation of both the expressions must match at 𝑥 = 𝑎

𝜃2 + 2𝜃3𝑥= 𝜃5 + 2𝜃6 𝑥 --------------(2)

(1) and (2) are the two required constraints.

b) Fit ˆf to data (xi , yi), i = 1, . . . , N by minimizing sum square error

Least sq objective = J(𝜃1,…., 𝜃6) = +

s.t to the following equations for all i=1,2,3……N

= ------------ (1)

= ------------ (1)

p(x) = θ1 + θ2x + θ3x 2 + θ4x 3 x ≤ a

q(x) = θ5 + θ6x + θ7x 2 + θ8x 3 x > a

