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```
%ENVR 755 Homework 2 part 2
```

F - municipal demand increases 1% per year

```
%loop that finds the total net benefit for all four sectors combined
 over
%five years

%[indoor, outdoor, veg, field]
growth = 0.1;
ipopulation = 1817000;
wpc = 140/325851; %water per capita
ei = -0.3;
eo = -0.75;
ev = -0.5;
ef = -1.5;
e = [ei, eo, ev, ef];
av = 547723;
af = 24154565;
p = [978, 978, 30, 30];
r = [532000, 400000];
q0 = [532000/4, 532000/4, 532000/4, 532000/4];

for year = 1:5;
    population = ipopulation * ((1 + growth).^(year-1));
    qtime = population * wpc;

    ai = (qtime*0.667)/(p(1)^ei);
    ao = (qtime*0.333)/(p(2)^eo);

    a = [ai, ao, av, af];

    %for 532000
    Qmore = lsqnonlin(@(q) lsquant(q, e, a, p, r(1)), q0, [0 0 0 0],
 [Inf Inf Inf Inf]);
    %for 400000
    Qless = lsqnonlin(@(q) lsquant(q, e, a, p, r(2)), q0, [0 0 0 0],
 [Inf Inf Inf Inf]);

    nb = netben(e, a, p, Qless, Qmore);
    tnb = sum(nb); %-1.6537e6
```

```
end
```

```
Local minimum possible.

lsqnonlin stopped because the final change in the sum of squares
 relative to
its initial value is less than the default value of the function
 tolerance.
```

```
Local minimum found.

Optimization completed because the size of the gradient is less than
the default value of the optimality tolerance.
```

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G

```
%market failure in this situation falls under the 'public good'
 category,
%implicitly valuing the endangered species
```

H

```
%[indoor, outdoor, veg, field]
growth = 0.1;
ipopulation = 1817000;
wpc = 140/325851; %water per capita
ei = -0.3;
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e = [ei, eo, ev, ef];
av = 547723;
af = 24154565;
p = [978, 978, 30, 30];
r = [532000, 400000];
q0 = [532000/4, 532000/4, 532000/4, 532000/4];

for year = 1:5;
    population = ipopulation * ((1 + growth).^(year-1));
    qtime = population * wpc;

    ai = (qtime*0.667)/(p(1)^ei);
    ao = (qtime*0.333)/(p(2)^eo);

    a = [ai, ao, av, af];

    hQmore = lsqnonlin(@(q) lsquant(q, e, a, p, r(1)), q0, [0 0 37594
 55263], [Inf Inf Inf Inf]);
    hQless = lsqnonlin(@(q) lsquant(q, e, a, p, r(2)), q0, [0 0 37594
 55263], [Inf Inf Inf Inf]);

    %find tnb for each like we did before
    nb = netben(e, a, p, Qless, Qmore);
    htnb = sum(nb); %-1.6537e6
    %discount rate nonsense for pvtnb
end
```

Local minimum possible.

lsqnonlin stopped because the final change in the sum of squares relative to its initial value is less than the default value of the function tolerance.

Local minimum found.

Optimization completed because the size of the gradient is less than the default value of the optimality tolerance.

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 tolerance.
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I

```
differencetnb = tnb - htnb; %0, difference betweeh f and h

% Based on my numbers from f and h, the difference is zero becasue
 these
% values came out the same. I'm not sure where my error popped up, but
 the
% net benefits of the situation with the transfer restrictions should
 be
% lower than with no restrictions.
```

J

```
%The transfer retrictions implicitly value farmers and more rural
%communities who depend on the farming industry. This is an example of
 a
%positive externality - supporting a whole slice of the population by
 changing the water
%allocations.
```

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