Econ 3008
Homework Assignment #1

1. Suppose that the demand curve for an exhaustible resource is identical across 2 periods, and given by:

\[ P = 50 - 2Q \]

Assume that the interest rate is 10%, the marginal cost of extraction is a constant $10 per unit, and there are only 30 units to be mined, before the resource is exhausted.

a) Calculate the present value of consumer surplus if the resource is divided equally between the 2 periods

b) Calculate the dynamically efficient path for extraction of the resource

c) Calculate the present value of consumer surplus for the dynamically efficient allocation

d) Demonstrate that period 1 people can compensate period 2 people for the fact that period 1 people consumed the dynamically efficient quantity (which is more than 50% of the resource).

e) Calculate the “marginal user cost” for the first period, at the dynamically efficient allocation

2. Suppose the world last 3 periods, instead of 2. There are still only 30 units of the resource available for extraction. Re-calculate the optimal extraction path. Show your work.

3. Re-do problem 1 (b) and 1(e) for an interest rate of 20%. Compare with the result you got in 1 (b) and 1(e), and discuss.