Exam I
(100 points)

(15 pts) 1. Given here is fully defining information for natural water demand by two separate agents, A and B:

$$w_A = 10 - 2p \quad \text{and} \quad mb_B = 4 - w_B .$$

What is total natural water demand if these two agents use water nonrivally from the same source? Fully depict the answer both graphically and mathematically.

(15 pts) 2. Monthly water use in Utility, TX is 32 million gallons, and the average household is paying $3 per thousand gallons. If the price elasticity of demand is –0.75, what is a good estimate of the aggregate water demand function in Utility? What units do the variables of your function utilize? Suppose that the rate is set at $3 because each and every 1000 gallons delivered to a household costs Utility exactly $3 to process and deliver, excluding any costs of natural water. What is the town's marginal net benefit function?

(20 pts) 3. Describe and explain any single general circumstance in which it would not be acceptable to qualify a policy-generated, secondary economic impact as a beneficial policy effect. [Do not use an example condition; discuss a general reason that dictates why unacceptability holds for all example conditions of this type.]

(25 pts) 4. Surface water rights of the prior appropriations doctrine and ground water rights under the Vernon Smith system are examples of what property right form? Assuming transferrability, describe the major features of each doctrine/system and comment on the feature's capability to promote efficient conservation.

(25 pts) 5. A brand new GWA (ground water authority) is charged with setting depletion targets and issuing rules that promote economic welfare in its jurisdiction (the entire aquifer). It is funding studies to estimate both average annual recharge and typical usage. All wells are metered with tamperproof equipment. The GWA has decided to halt depletion. Aquiferwide, if average annual use is found to be twice (or x times) average recharge, then each well will be granted a permit that is half (or 1/x times) its historical average use. Assume that it is "twice". Under the Halt policy it is expected that the water table (aquifer height) will fall during dry periods, but it will rebound and be steady "on average" into the foreseeable future. To limit the economic damage of this strict program, the permits are transferrable. Fractional permits can be transferred too. New wells are allowed, but they receive no "free" permits.

(a) Draw an appropriately scaled, interpretative 2-period diagram of this situation using MNB_0 for Halt's first year (now) and MNB_1 for the forthcoming 99 years (lumped together for simplication purposes). Include only what is important. (b) Explain the components of the graph, their definitions, and why they are placed where they are. (c) Show water use before the Halt policy and after. (d) Explain whether Halt improves the dynamic economic efficiency of water use? (e) What are the losses attributable to Halt in year 0, and what are the gains for the future?