PAI 897 Name:_____
Problem Set 10

1) Ethiopia is currently considering putting in place a disease free zone where animals can be held and observed for six weeks. Animals held for this length of time in the zone are eligible to be exported to Saudi Arabia. If an animal does not go through this process, it is not allowed to be exported internationally and is sold domestically. The value of an animal in Saudi Arabia is twice what it is worth in Ethiopian markets – that is a bull that sells for $150 USD in Ethiopia is worth $300 if exported to Saudi Arabia. It will cost us 20 million USD in t=0 to build the disease free zone. During year zero, animals will be marketed domestically so domestic revenue and costs will apply. In years t=1, t=2, and t=3 it will cost us 5 million per year to provide veterinary goods and services to establish the disease free zone and 10 million per year to buy feed for animals held in the zone and animals will be marketed in Saudi Arabia. Production for the domestic market currently has 2 million per year spent on veterinary goods and the implicit cost of feeds consumed by domestically marketed animals is estimated to be 5 million per year. Revenue per year of selling animals domestically is 15 million. The same animals sold in Saudi Arabia are worth 30 million. The discount rate is 10%.
What is the net present value of producing for the domestic market?

	Benefits	Costs
T=0		
T=1		
T=2		
T=3		
NPV		

What is the net present value of building the disease free zone and selling in Saudi Arabia?

	Benefits	Costs
T=0		
T=1		
T=2		
T=3		
NPV		

Which is preferable in NPV terms?

Discuss how this demonstrates the difference between “before and after” and “with and without” in benefit cost analysis.

2) Studies have shown that placing trained nutrition monitors in local clinics leads to lower child malnutrition rates in your country. Studies also show that improved school feeding programs leads to lower child malnutrition in your country. Two proposals are on your desk, each designed to reduce the child malnutrition rate in your country by 1% per year. You only have enough operating funds to do one, and you can't combine them – it is pick one or the other.

Placement of nutrition monitors: This is a three year program (start up recruitment and hiring is year zero, year one the monitors are in place working, year two the monitors are in place working, then the project phase ends) to hire and place in local clinics the nutrition monitors. It will cost 2.3 million in the current start up year to hire and place these monitors, and will cost 1 million per year for each of two years of program implementation to pay the salaries of these local nutrition monitors.

School feeding: This is also a three-year program (start up and organization in year zero, then feeding in the following two years t=1 and t=2, then the project phase ends) to provide food to children in primary schools. T=0 costs 1.6 million, and the operating costs per year are 1.4 million for the following two years.

a. Which program achieves the targeted reduction of the child malnutrition rate at the lowest present value cost if the discount rate is 10%?

b. Which program achieves the targeted reduction of the child malnutrition rate at the lowest present value cost if the discount rate is 5%?

c. Contrast your answer to (a) and (b) by describing how future expenses are impacted by a relatively lower discount rate, and the pattern of cost flows for the two policies.

3) Highland agriculture in Nepal is facing problems due to soil erosion. You are considering two different programs that will address the soil erosion problem over a four year time horizon (t=0, t=1, t=2, t=3). The present value of benefits due to reduced soil erosion resulting from **either program** is estimated to be 5 million dollars. The discount rate is given as 10%.

Program One: Agroforestry. This tree planting project will cost 3 million dollars in the current year (t=0). The trees will provide a benefit in addition to combating soil erosion in the form of marketable seeds. This benefit is estimated to be 0.5 million dollars in the first year after they are planted (t=1), 1 million dollars in the second year after they are planted (t=2), and 0.5 million dollars in the third year after they are planted (t=3). After this time the trees will no longer produce seeds, thus this benefit will come to an end.

Program Two: Bund construction. Bunds are an anti soil erosion measure that involves building dirt and stone rows across steeply sloped land to reduce soil erosion. Bund construction will take two years, the current year (t=0) and next year (year 1). It will cost 1 million dollars each year to construct these bunds.

a. Which program is superior in NPV terms?

b. Does your answer change if the benefits of the marketable seeds is lower than predicted in the original scenario, and is instead 0.25 million when t=1, 0.5 million when t=2, and 0.25 million when t=3?

4) Questions about cost benefit methods

a) What is the difference between a real and a nominal value?

b) Why are taxes and interest payments not counted as costs in cost benefit analysis?

c) Why is job creation not a benefit in cost benefit analysis?

d) Why do we discount?

e) Contrast net present value and internal rate of return as ways to present cost benefit findings.