Assignment 1

*Note: You may talk to fellow students about the assignment, but **do not copy**
others' work. Make whatever assumptions you feel necessary, but state them
explicitly.*

(15) 1.   Answer both parts:

   i.   Using the discount rate of 10%, determine (a) the NPV and (b) the
        IRR of two mutually exclusive investment projects A and B.
        (Excel will calculate them.) (c) Which project should you
        undertake? Why?

	Project A	Project B
Initial cost	$1,000	$1,000
Net cash flows(years)		
Year 1	300	–100
Year 2	300	10
Year 3	300	300
Year 4	300	300
Year 5	300	1,400

   ii. There is a limited capital budget of $2,400 for the coming year.
        (a) Which projects(s) should be undertaken if the NPV investment
        criterion is used? (b) Is this the correct decision? Why?

	Project A	Project B	Project C
NPV excluding K_0	$3,000	$1,750	$1,400
Initial capital cost K_0	2,400	1,300	1,100

(25) 2.   Briefly (one or two paragraphs on each) answer all parts:

   a.   A project will hire 200 skilled workers: 50 will be diverted from
        elsewhere, and their previous employer has been paying $500 a
        week for them (including 20% tax); the rest will give up their
        taxi-driving jobs (they will reenter the skilled labour market).
        What shadow price should CBA analysts use for these workers?

   b.   What is the Net Benefit Investment Ratio (NBIR)? How does it
        differ from the Benefit/Cost Ratio (BCR)? How do you think the
        NBIR might be a better criterion than the BCR?

c. The following table comes from page 30 of the Dept. of Finance *Handbook*:

Supply/demand	Produce output	Consume input
Incremental	Observed market price	Observed market price less taxes
Displaced	Observed market price less taxes	Observed market price

Explain the rationale behind these shadow prices. (Hint: think of the opportunity costs.)

d. Because of a recent wave of jewellery shop robberies, police surveillance of jewellery shops is increased, which costs the state an extra $500,000 per year. As a result, however, the amount of jewellery that is stolen falls. Specifically, without the increase in surveillance, jewellery with a retail price of $1 million would have been stolen. This stolen jewellery would have been fenced (sold to receivers of stolen goods) by the thieves for $600,000.

What is the net *social* benefit resulting from the increased police surveillance? Explain.

(30) 3. The government is considering building a freeway (for trucks only) between two cities. This would cut journey time by 6 minutes and save 2 litres of fuel per journey. The number of journeys that will be diverted from other routes onto the freeway is 100,000 a year, and 50,000 new journeys will be made. The wage of truck drivers (one per vehicle) is $4 per hour, and the price of fuel $1.00 per litre (including 80¢/litre tax). The interest rate on long-term government bonds is 10% p.a., and the cost of building the freeway $1,200,000.

a. Using only this information, would you recommend building the freeway? Explain.

b. If you could ask for additional information, what else would you wish to know? (Assume everyone has the same income.) Explain.

(30) 4. Consider a proposal by a private company, Interlingua Pty. Ltd., to establish an institute to teach adult Australians foreign languages, especially those of our trading partners. Interlingua concludes, on a straight financial appraisal, that the present value of its costs outweigh the present value of its revenues, and so concludes that the proposal should not proceed.

a. The criterion of "internal rate of return" (IRR) is sometimes used to determine the desirability of projects. Describe how IRR is determined. In what way (or ways) is NPV, the net present value, better than IRR as a criterion?

b. Interlingua is required to pay a 10% payroll tax to the State government. (A payroll tax is levied on employers' wage bills, and thus increases the cost of labour to the firm.) In a social cost-benefit analysis, how should Interlingua adjust the cost of labour? Is this adjustment affected by the price elasticity of labour supply? Explain.

c. After this adjustment, the NPV of the proposal is still negative. Some of the employees will be scarce managers and language instructors (for whom there is virtually no rate of unemployment). For other employees — unskilled and semi-skilled — there is a 10% rate of involuntary unemployment. For this second group, does the before-payroll-tax wage rate accurately reflect the opportunity cost of labour? If not, how should the wage rate be adjusted? Explain.

d. After this further adjustment, the NPV of the project is still negative. A policy change on the Government's part, however, emphasises the benefits to Australia of a more polyglot[1] adult population (both for exports and for in-bound tourism). The external effects of the proposal are in line with government policy. How might such externalities be evaluated? Explain.

e. If the full-blown social cost-benefit analysis shows that the NPV of the project is positive, should it be undertaken? Why? How might Interlingua be induced to undertake the proposal? Is this desirable? Explain.

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1. Literally "many tongues," *polyglot* means speaking or writing several languages.