Assignment: ECO 1192 B
(Fall 2015)

General Instructions

- This assignment includes a total of 20 questions. You are required to submit answers to **any 15** of these 20 questions.
- The grades received in this assignment will count towards 20% of the final grade.
- The assignment is to be submitted individually; i.e. this is an individual project submission (NOT a group submission.)
- The assignment is due in class on **Tuesday, December 1 at 7:00 PM**
- VERY IMPORTANT: when handing-in the assignment, you MUST sign on the assignment submission sign-up sheet. Failure to do so, may result in zero (0) grade for the assignment.
- Please make sure that your full name and student ID are clearly written on the first page of the assignment AND also as a header on subsequent pages of the assignment (if you are submitting hand-written copy, please ensure that your writing is legible and you have provided your initial on every page of your assignment.)
- Please ensure that page number is provided, as a footer, using the following format – *Page X of Y*.

Further Instructions

- The problems in the assignment are chosen from all chapters.
- Final exam will be cumulative and hence will include all chapters being covered in class.
- Exam questions will be reflective of the questions included in the assignment. Hence, students are highly encouraged to attempt these problems and learn the techniques used to solve these questions.
- For MT2, please attempt the problems from the relevant chapters first in order to better prepare for the exam.
- Beyond MT2, study all problems again in order to prepare for the final exam.

Good luck!! Bonne Chance!!

CHAPTER 2

1) If the effective equivalent annual interest rate is 22.2%, and interest is compounded quarterly, what is the corresponding nominal annual interest rate?

2) How long will it take for a $250 deposit to double in value for each of the following: i) 8% per year, compounded daily; and ii) 11% per year, compounded semi-annually.

CHAPTER 3

3) How much should you invest today at 12% interest to accumulate $1,000,000 in 30 years?

4) What is the present worth of the total 20 payments, occurring at the end of every four months (i.e. the first payment is in four months), which are $400, $500, $600, increasing by a fixed sum. Interest is 12% nominal per year, compounded monthly.

5) Octavia is looking at an investment in upgrading an inspection line at her plant. The initial cost would be $140,000 with a salvage value of $37,000 after five years. How much money must be saved every year to justify the invest at an interest rate of 14%?

CHAPTER 4

6) Margaret has a project with $28,000 first cost that returns $5,000 per year over 10-year life. It has a salvage value of $3,000 at the end of 10 years. If the MARR is 15%, what is the present worth of this project?

7) You want to have $750,000 in the bank when you retire. You think you can save $10,000 a year in a bank that offers you 7.5% interest. If you make your

first deposit in a year's time, how many years will it be from now before you can retire?

CHAPTER 5

8) Sam has three investment opportunities. The first one will require an initial cost of $100,000 and will return $150,000 one year from now. The second investment requires an outlay of $200,000 and will return $300,000 after one year. The third one requires an upfront cost $250,000 and will return $355,000 one year from now. The problem is that only one investment opportunity can be availed. Alternatively Sam can put his money into a savings bond that pays 20%. Which investment opportunity should Sam opt for?

9) Patti's project has a first cost *P*, annual savings *A*, and a salvage value of $1,000 at the end of the 10-year service life. She has calculated the present worth as $20,000, the annual worth as $4,000, and the pay back period as three years. What is the IRR for this project?

CHAPTER 6

10) A five-year-old gadget has a current book value of $203,000. It has been observed that the gadget loses it value over time in a manner that can be best captured through the use of the declining-balance method. The depreciation rate was estimated to be 0.31. What was the original price? What will be the book value in two years from now?

11) Candi has just purchased a car for $7,500. She expects that the value of this car will decline by 13% each year. Eventually Candi wants to sell this car for $2,000 and buy a new one. How many years should Chandi use this car before she can sell it?

CHAPTER 8

12) A chemical recovery system costs $30,000 and saves $5,280 each year of its seven=year life. The salvage value is estimated at $7,500. The after-tax MARR is 9% and taxes are at 45%. What is the next after-tax annual benefit or cost of purchasing the chemical recovery system?

13) What is the total after-tax annual cost of a machine with a first cost of $45,000 and operating and maintenance cost of $0.22 per unit produced? It will be sold for $4,500 at the end of five years. Production is 750 units per day; 250 days per year. The CCA rate is 30%, the after-tax MARR is 20%, and the corporation income tax rate is 40%.

CHAPTER 9

14) Inflation is expected to average 4 percent over the next 50 years. How much would you expect to pay 50 years from now for a burger costing $1.59 today?

15) Ken will receive a $5,000 annual payment from a family trust. This will continue until Ken in 30; he is now 20. Inflation averages 4% and Ken's real MARR is 8%. If the first payment is a year from now and a total of 10 payments are to be made, what is the present worth of his remaining income from the trust?

16) The widget industry maintains a price index for a standard collection of widgets. The base year was 2002 until 2012, when the indeed was recomputed with 2012 as the base year. The following data concerning prices for the years 2010 to 2013 are available:

Year	Price Index 2002 Base	Price Index 2012 Base
2010	125	N/A
2011	127	N/A
2012	130	100
2013	N/A	110

What was the percentage increase in prices of widgets between 2010 and 2013?

17) Lifeware, a manufacturer of women's sports clothes, is considering adding a line of skirts and jackets. The production would take place in a part of its factory that is now not being used. The first output would be available in time for the 2015 fall season. The following information is available:

New Product Line Information	
First cost in 2014 ($)	15,500,000
Planned output (units/year)	325,000
Observed, current dollar MARR before tax	0.25
Study period	6 years
Year 2014 Prices ($/unit)	
Materials	12
Labour	7.75
Output	35

(a) What is the real internal rate of return?

(b) What inflation rate will make the real MARR equal to the real internal rate of return?

(c) Calculate the present worth of the project under three possible future inflation rates: 1%, 2% or 3% per year.

(d) Decide if Lifeware should add this new line of skirts and jackets. Provide your explanation.

CHAPTER 12

18) Power Tech builds power-surge protection devices. One f the components, a plastic moulded cover, can be produced by two automated machines, A1 and A2. Each machine produces a number of defects with probabilities shown in the following table.

A1		A2	
No. of Defects (out of 100)	**Probability**	**No. of Defects (out of 100)**	**Probability**
0	0.3	0	0.25
1	0.28	1	0.33
2	0.15	2	0.26
3	0.15	3	0.1
4	0.1	4	0.05
5	0.02	5	0.01

Which machine is better with regard to the expected number of defective products?

19) Regional Express is a small courier service company. By introducing a new computerized tracking device, it anticipates some increase in revenue, currently estimated at $2.75 per parcel. The possible new revenue ranges from $2.95 to $5.00 per parcel, with probabilities shown in the table below. Assuming that Regional's monthly capacity is 60,000 parcels and the monthly operating and maintenance costs are $8,000, what is the present worth of the expected revenue over 12 months? Regional's MARR is 12%, compounded monthly.

Revenue per parcel	$2.95	$3.25	$3.50	$4.00	$5.00
Probability	0.1	0.35	0.3	0.15	0.1

CHAPTER 10

20) A province in Canada is considering the construction of a bridge. The bridge would cross a narrow part of a lake near a provincial park. The major benefit of the bridge would be reduced travel time to a campsite from a nearby urban centre. This lowers th cost of camping trips at the park. As well, an increase in the number of visits resulting from the lower cost per visit is expected.

Data concerning the number of week-long visits and their costs are shown below:

Inputs	Number of Visits and Average Cost per Visit to Park	
	Without Bridge	With Bridge
Travel cost ($)	140	87.5
Use of equipment ($)	50	50
Food ($)	100	100
Total ($)	290	237.5
Number of visits/year	8,000	11,000

The following data are available as well:

(a) The bridge will take one year to build.

(b) The bridge will have a 25-year life once it is completed. This means that the time horizon for computations is 26 years.

(c) Construction cost for the bridge is $3,750,000. Assume that this cost is incurred at the beginning of year 1.

(d) Annual operating and maintenance costs for the bridge are given by:
$7,500 + 0.25$q$
Where $7,500 is the fixed operating and maintenance cost per year and q is the number of crossings.

(e) Operating an maintenance costs are incurred at the end of each year over which the bridge is in operation. This is at the ends of years 2, 3, …., 26.

(f) The MARR is 10%.

(g) The annual benefits for this project is estimated to be $498,750.

i) Compute the present worth of the project.

ii) Compute the benefit-cost ratio.

iii) Compute the modified benefit-cost ratio.