

ENGINEERING ECONOMICS
ECO 1192A

Blue Assignment

C.Théoret

Fall 2015

A. Assignment Instructions

1. Consult the Excel assignment allocation file on Virtual Campus for your individual assignment.
2. You will get a zero score for completing a different assignment.
3. A **BLUE Scantron (answer sheet)** is required for your answers.
4. The colour of your Scantron is identified by a “Highlighter” mark in its upper right-hand corner.
5. The “Course Code” on the Scantron answer sheet for this assignment is **ECO1192AB**. Do not forget to darken the appropriate ovals.
6. Answer sheets (Scantrons) will be distributed and collected at the beginning of the **December 8th** lecture.
7. Late Scantron sheets will **most definitely** be rejected.
8. **Please note** that the last answer to each question is implicitly “None of these answers” unless the answers provided cover all possibilities (e.g., answers a) True; b) False)).
For example, if the answers a), b), c) and d) following a question seem incorrect to you, you should add the answer “e) None of these answers”.
Of course, the alphabetic character of the answer that you add will depend on the alphabetic character of the last answer provided (i.e., it could be c), d) or e)).

B. Problems and Questions

QUESTIONS 1 to 19			
A city is considering the purchase of a tractor for snowplowing its sidewalks during winter. The parameters of each tractor are provided below.			
	Tractor Information		
Project Parameters	Case	Massey	Ford
1. Initial Cost (\$)	235,000	300,000	350,000
2. Annual revenues (\$)	120,000	125,000 at EOY1 increasing annually thereafter by 1,000	145,000
3. Annual costs (\$)	50,000 at EOY1 increasing annually thereafter by 4%	75,000	100,000 at EOY1 decreasing annually thereafter by 5%
4. End-of-life salvage value (\$)	15,000	-13,000	5,000
5. Useful life (years)	4	10	5
6. Industry Standard	5 years		
MARR = 10%			

1. The Net Future Worth (NFW) to the nearest \$100 of the Case tractor after 4 years is
a) \$20,700; b) \$31,800; c) \$39,100; d) \$40,900
2. The NFW to the nearest \$100 of the Massey tractor after 10 years is
a) \$65,100; b) \$64,500; c) \$55,800; d) \$53,400.
3. The NFW to the nearest \$100 of the Ford tractor after 5 years is
a) \$69,900; b) \$72,000; c) \$73,100; d) \$73,600.
4. The NFW to the nearest \$100 of the Case tractor after 20 years (it was repeated several times) is
a) \$166,600; b) \$172,900; c) \$174,400; d) \$198,900.
5. The NFW to the nearest \$100 of the Ford tractor after 20 years (it was repeated several times) is

- a) \$179,800; b) \$182,700; c) \$183,900; d) \$189,600.
6. The best tractor model based on the NFW method is
a) Case; b) Massey; c) Ford.
 7. Based on the discounted payback method, the recovery period in years (to the nearest half or full year) of the Case tractor is
a) 3.3 years; b) 4.2; c) 4.5; d) More than 5 years.
 8. Based on the discounted payback method, the recovery period in years (to the nearest half or full year) of the Massey tractor is
a) 7.5 years; b) 8.5; c) 9.0; d) 9.5.
 9. Based on the discounted payback method, the recovery period in years (to the nearest half or full year) of the Ford tractor is
a) 6.5 years; b) 7.5; c) 9.0; d) 9.5.
 10. The best tractor model based on the discounted payback method is
a) Case; b) Massey; c) Ford.
 11. The benefit/cost (B/C) ratio (to the nearest 1st decimal) of the Case tractor is
a) 0.8; b) 0.9; c) 1.1; d) 1.2.
 12. The benefit/cost (B/C) ratio (to the nearest 1st decimal) of the Ford tractor is
a) 1.0; b) 1.1; c) 1.3; d) 1.4.
 13. The incremental B/C ratio (to the nearest 1st decimal) between tractors Case and Massey is
a) 0.7; b) 1.0; c) 1.1; d) 1.2.
 14. The best tractor based on the incremental B/C ratio is
a) Case; b) Massey; c) Ford.
 15. The Internal Rate of Return (IRR) of the Case tractor (to the nearest 1st decimal) is
a) 13.5%; b) 13.7%; c) 13.9; d) 14.1%.
 16. The Internal Rate of Return (IRR) of the Massey tractor (to the nearest 1st decimal) is
a) 9.5%; b) 11.9%; c) 12.1%; d) 12.4%.
 17. The incremental Internal Rate of Return (IRR) between the Case and Massey tractors (to the nearest 1st decimal) is
a) 3.9%; b) 4.2%; c) 4.3%; d) 5.4%.

18. The incremental Internal Rate of Return (IRR) between the Case and Ford tractors (to the nearest 1st decimal) is
a) 7.8%; b) 7.9%; c) 8.1%; d) 8.7%.
19. The best tractor based on the incremental Internal Rate of Return (IRR) method is
a) Case; b) Massey; c) Ford.

QUESTIONS 20 to 42

You are planning the purchase of a commercial building. The financial information on this potential investment includes:

1. Projected ownership of 4 years.
2. Rental revenues before taxes of \$150,000 in year 1 growing thereafter at an annual rate of 2%.
3. Annual expenses of \$60,000 in year 1 growing thereafter by \$2,000 per year.
4. Today's asking price for the building is \$0.5 million with an expected selling price of \$0.60 million in 4 years.
5. The Canadian income tax rate on this type of investment is assumed to be 50% (on profits before taxes, capital gains or losses, and on recaptured depreciation).

(Please disregard horizontal line. I can't seem to remove it)

6. Buildings and equipment are to be depreciated using the DB method and a 15% depreciation rate.
7. The half-year rule applies to the depreciation of the building.
8. Working capital = \$0.
9. You will need a loan of \$0.25 million at a 10% rate.
10. The repayment schedule of the \$0.25 million loan is:
 - End-of-year 1 (EOY1) = 10%
 - EOY2 = 25%
 - EOY3 = 25%
 - EOY4 = 40%
11. The annual inflation rate is 2.0%.
12. MARRs are
 - Before-taxes with inflation = 12%
 - Before-taxes without inflation (inflation-free) = 10%
 - After-taxes with inflation = 6%
 - After-taxes without inflation (inflation free) = 4%

BTCF = Before-Tax Cash Flow; ATCF = After-Tax Cash Flow; CFOE = Cash Flow on Owner Equity

	<u>END-OF-YEAR (EOY)</u>				
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Annual revenues (AR) (Actual \$)					
Annual costs (AC) (Actual \$)					
1. BTCF "Operations" (Actual \$)		AA		BB	
2. BTCF "SV" (Actual \$)					CC
3. BTCF "Working Capital" (Actual \$)					
4. Total BTCF (Actual \$)			DD		
5. BTCF "Operations" (Constant \$)				EE	
6. BTCF "SV" (Constant \$)					FF
7. BTCF "Working Capital" (Constant \$)					
8. Total BTCF (Constant \$)			GG		
9. Annual Depreciation				HH	
10. Interest on loan					II
11. Taxable Operating Income					
12. Taxes on Operating Income			JJ		
13. Capital gains					KK
14. Taxes on capital gains					
15. Recaptured depreciation					LL
16. Taxes on recaptured dep.					MM
17. ATCF "Operations" (Actual \$)					NN
18. ATCF "Operations" (Constant \$)					
19. ATCF "SV" (Actual \$)					
20. ATCF "SV" (Constant \$)					
21. ATCF "Working Capital" (Actual \$)					
22. ATCF "Working Capital" (Constant \$)					
23. Total ATCF (Actual \$)				OO	

	END-OF-YEAR (EOY)				
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
24. Total ATCF (Constant \$)	PP			QQ	
25. (=R10.) Interest on loan			RR		
26. Loan repayment					SS
27. CFOE (Actual \$)	TT				
28. CFOE (Constant \$)	UU				

20. The dollar amount of cell AA (nearest \$1000) is
a) \$45,000; b) \$70,000; c) \$90,000; d) \$100,000.
21. The dollar amount of cell BB (nearest \$100) is
a) \$65,400; b) \$66,200; c) \$78,600; d) \$92,100.
22. The dollar amount of cell CC (nearest \$1000 dollars) is
a) \$600,000; b) \$620,000; c) \$680,000; d) \$700,000.
23. The dollar amount of cell DD (nearest \$100) is
a) \$41,200; b) \$91,000; c) \$91,100; d) \$92,800.
24. The dollar amount of cell EE (nearest \$100) is
a) \$86,800; b) \$87,100; c) \$88,200; d) \$88,400.
25. The dollar amount of cell FF (nearest \$100) is
a) \$553,600; b) \$553,900; c) \$554,300; d) \$554,600.
26. The dollar amount of cell GG (nearest \$100) is
a) \$86,900; b) \$87,000; c) \$87,300; d) \$87,500.
27. The dollar amount of cell HH (nearest \$100) is
a) \$58,200; b) \$58,600; c) \$59,000; d) \$68,200.
28. The dollar amount of cell II (nearest \$1000) is
a) \$5,000; b) \$6,900; c) \$7,300; d) \$10,000.
29. The dollar amount of cell JJ (nearest \$100) is
a) -\$500; b) -\$400; c) \$700; d) \$800.
30. The dollar amount of cell KK (nearest \$1000) is
a) \$50,000; b) \$100,000; c) \$110,000; d) \$120,000.
31. The dollar amount of cell LL (nearest \$1000) is
a) \$216,000; b) \$399,000; c) \$392,000; d) \$432,000.
32. The dollar amount of cell MM (nearest \$1000) is
a) \$105,000; b) \$107,000; c) \$108,000; d) \$110,000.
33. The dollar amount of cell NN (nearest \$100) is
a) \$52,800; b) \$53,900; c) \$74,800; d) \$76,700.
34. The dollar amount of cell OO (nearest \$100) is
a) \$55,600; b) \$83,600; c) \$93,900; d) \$103,600.
35. The dollar amount of cell PP is

- a) -\$0.5M; b) -\$1.0M; c) -\$1.5M; d) -\$2.0M.
36. The dollar amount of cell QQ (nearest \$1000) is
a) \$74,000; b) \$77,000; c) \$79,000; d) \$82,000.
37. The dollar amount of cell RR (nearest \$100) is
a) \$11,300; b) \$20,300; c) \$22,500; d) \$45,000.
38. The dollar amount of cell SS (nearest \$1000) is
a) \$50,000; b) \$100,000; c) \$110,000; d) \$120,000
39. The dollar amount of cell TT is
a) -\$0.25M; b) -\$0.5M; c) \$0.25M; d) 0.5M.
40. The dollar amount of cell UU is
a) -\$0.25M; b) -\$0.5M; c) \$0.25M; d) 0.5M.
41. The MARR required for the calculation of the Net Present Worth of the investment's After-Tax Cash Flow (BTCF) in current dollars is
a) 4%; b) 6%; c) 10%; d) 12%.
42. The MARR required for the calculation of the Net Present Worth of the investment's Cash Flow on Owner Equity (CFOE) in constant dollars is
a) 4%; b) 6%; c) 10%; d) 12%.

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