Faculté des sciences sociales | Faculty of Social Sciences

uOttawa

Département de science économique
Department of Economics

ENGINEERING ECONOMICS

ECO 1192B

White Assignment

C.Théoret **Fall 2017**

A. Assignment Instructions

1. **Consult the Excel assignment allocation file on Blackboard Learn for your specific assignment.**
2. **Your score for completing a different assignment will be zero.**
3. **A WHITE Scantron (answer sheet) is required for your answers.**
4. **The "Course Code" for this assignment on the answer sheet is ECO1192BW. Do not forget to darken the appropriate ovals.**
5. **Answer sheets will be distributed and collected at the beginning of the October 17th lecture.**
6. **Late answer sheets will most definitely be rejected.**
7. **Please note that the last answer for each question is implicitly "None of these answers" unless the answers provided cover all possibilities (e.g., Answers a) True; b) False).**

Example: ***If the answers provided for a question are a), b), c) and d) seem incorrect to you, please add the answer "e) None of these answers" on the answer sheet. 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

The owner of a seniors' residence is planning the purchase an electrical generator to minimize the discomfort due to electrical power outages. The key parameters of the three advertising campaigns are provided below.

Project Parameters	Alpha	Beta	Gamma
1. Initial Cost ($)	600,000	700,000	800,000
2. Revenues ($)	600,000 at EOY1 decreasing by 2% annually thereafter.	770,000 at EOY1 increasing by 5,000 annually thereafter.	900,000 at EOY1 increasing by 1% annually thereafter.
3. Operating Costs ($)	400,000 at EOY1 increasing by 4,000 annually thereafter.	572,000 at EOY1 increasing by 1% annually thereafter.	640,000 at EOY1 increasing by 40,000 annually thereafter.
4. End-of-life salvage value ($)	0	15,000	10,000
5. Useful life (years)	5	5	10

- **Industry Standard = 4 years**
- **MARR = 10%**

1. Alpha's Net Present Worth (NPW) (rounded to the nearest $100) is
   a) $44,900; b) $45,200; c) $49,900; d) $56,900

2. Beta's NPW (rounded to the nearest $100) is
   a) $54,600; b) $58,900; c) $59,700; d) $60,900.

3. If Beta was repeated for a second five-year period (i.e., years 6 to 10), its NFW (rounded to the nearest $100) after 10 years would be
   a) $193,400; b) $229,400; c) $227,600; d) $233,900.

4. After 20 years (it was repeated several times), Gamma's Annual Equivalent Worth (AEW) (rounded to the nearest $100) is
   a) $12,800; b) $12,900; c) $13,600; d) $14,300.

5. Beta's AEW (rounded to the nearest $100) is
   a) $12,800; b) $13,300; c) $14,400; d) $15,100.

6. The best generator based on the NPW method is
   a) Alpha; b) Beta; c) Gamma.

7. Based on the simple payback method, Alpha's recovery period (nearest half or full year) is

a) 2.5 years; b) 3.0; c) 3.5; d) 4.0.

8. Based on the simple payback method, Gamma's "project balance" after 2 years (rounded to the nearest $100) is
a) $-347,900; b) $-311,000; c) $-222,300; d) $132,600

9. Based on the discounted payback method, Alpha's recovery period (nearest half or full year) is
a) 4.5 years; b) 5.0; c) 6.0; d) 6.5.

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10. Based on the discounted payback method, Gamma's "project balance" after 3 years (rounded to the nearest $100) is
a) $-345,600; b) $-300,200; c) $-298,100; d) $55,400.

11. Based on the simple payback method, Beta's "project balance" after 3 years (rounded to the nearest $100) is
a) $-111,700; b) $-108,200; c) $-86,100; d) $88,300.

12. Gamma's benefit/cost (B/C) ratio (second decimal; no rounding) is
a) 0.89; b) 1.01; c) 1.06; d) 1.08.

13. Beta's benefit/cost (B/C) ratio (second decimal; no rounding) is
a) 1.01; b) 1.05; c) 1.12; d) 1.4.

14. The incremental B/C ratio ((second decimal; no rounding) between Alpha and Beta is
a) 0.88; b) 1.01; c) 1.06; d) 1.08.

15. The incremental B/C ratio (second decimal; no rounding) between Beta and Gamma is
a) 0.56; b) 0.78; c) 1.04; d) 1.08.

16. Gamma's Internal Rate of Return (IRR) (second decimal; no rounding) is
a) 11.55%; b) 13.96%; c) 14.24%; d) 15.29%.

17. Beta's Internal Rate of Return (IRR) (second decimal; no rounding) is
a) 12.48%; b) 12.98%; c) 13.20%; d) 13.34%.

18. The incremental Internal Rate of Return (ΔIRR) between Alpha and Gamma (second decimal; no rounding) is
a) 4.89%; b) 5.12%; c) 5.41%; d) 7.89%.

19. Alpha's External Rate of Return (ERR) (second decimal; no rounding) is
a) 11.77%; b) 11.95%; c) 12.18; d) 12.35%.

20. Beta's External Rate of Return (ERR) (second decimal; no rounding) is

a) 11.12%; b) 11.47%; c) 11.66%; d) 12.12%.

21. The incremental External Rate of Return (ΔERR) between Alpha and Beta (second decimal; no rounding) is
a) 10.31%; b) 10.52%; c) 10.79%; d) 10.98%.

22. The incremental External Rate of Return (ΔERR) between Beta and Gamma (second decimal; no rounding) is
a) 10.02%; b) 10.19%; c) 10.58%; d) 11.13%.

23. Is Gamma an acceptable project based on the conventional B/C ratio?
a) Yes; b) No; c) Impossible to determine its acceptance from the cash flow information provided.

24. Must the annual equivalent and the B/C ratio methods come to the same conclusion as to the acceptance of a project?
a) Yes; b) No.

25. If the residence's equipment budget is $1,300,000, which generator(s) should it purchase assuming that generators are independent investments?
a) Gamma only; b) Alpha and Beta; c) Alpha and Gamma; d) Beta and Gamma.

26. John plans to make semi-annual (i.e., every six months) bank deposits of $200 (beginning six months from today) in a savings account that pays 12% interest compounded semi-annually. Which of the following answers would provide the balance of John's savings account after 3 years (i.e., after his 6^{th} $200 deposit)?
    a) FW=200(F/A,12%,6) where FW = Future Worth
    b) FW=200(F/A,12%/2,3)
    c) FW=200(F/A,12%/2,6)
    d) FW=200(2)(F/A,12%,3)

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DISCRETE CASH FLOWS AND DISCRETE COMPOUNDING								
10.00 % DISCRETE RATE OF INTEREST								
n	(F/P,i%,n)	(P/F,i%,n)	(A/P,i%,n)	(P/A,i%,n)	(A/F,i%,n)	(F/A,i%,n)	(A/G,i%,n)	(P/G,i%,n)
1	1.1000	0.9091	1.1000	0.9091	1.0000	1.0000	0.0000	0.0000
2	1.2100	0.8264	0.5762	1.7355	0.4762	2.1000	0.4762	0.8264
3	1.3310	0.7513	0.4021	2.4869	0.3021	3.3100	0.9366	2.3291
4	1.4641	0.6830	0.3155	3.1699	0.2155	4.6410	1.3812	4.3781
5	1.6105	0.6209	0.2638	3.7908	0.1638	6.1051	1.8101	6.8618
6	1.7716	0.5645	0.2296	4.3553	0.1296	7.7156	2.2236	9.6842
7	1.9487	0.5132	0.2054	4.8684	0.1054	9.4872	2.6216	12.7631
8	2.1436	0.4665	0.1874	5.3349	0.0874	11.4359	3.0045	16.0287
9	2.3579	0.4241	0.1736	5.7590	0.0736	13.5795	3.3724	19.4215
10	2.5937	0.3855	0.1627	6.1446	0.0627	15.9374	3.7255	22.8913
11	2.8531	0.3505	0.1540	6.4951	0.0540	18.5312	4.0641	26.3963
12	3.1384	0.3186	0.1468	6.8137	0.0468	21.3843	4.3884	29.9012
13	3.4523	0.2897	0.1408	7.1034	0.0408	24.5227	4.6988	33.3772
14	3.7975	0.2633	0.1357	7.3667	0.0357	27.9750	4.9955	36.8005
15	4.1772	0.2394	0.1315	7.6061	0.0315	31.7725	5.2789	40.1520
16	4.5950	0.2176	0.1278	7.8237	0.0278	35.9497	5.5493	43.4164
17	5.0545	0.1978	0.1247	8.0216	0.0247	40.5447	5.8071	46.5819
18	5.5599	0.1799	0.1219	8.2014	0.0219	45.5992	6.0526	49.6395
19	6.1159	0.1635	0.1195	8.3649	0.0195	51.1591	6.2861	52.5827
20	6.7275	0.1486	0.1175	8.5136	0.0175	57.2750	6.5081	55.4069