

## ENGINEERING ECONOMICS

ECO 1192B

### Pink Assignment

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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 PINK Scantron (answer sheet) is required for your answers.
4. The colour of your answer sheet is identified by a short “Hi-Liter” line in its upper right-hand corner.
5. The “Course Code” for this assignment on the answer sheet is **ECO1192BP**. Do not forget to darken the appropriate ovals.
6. Answer sheets will be distributed and collected at the beginning of the **October 17<sup>th</sup>** lecture.
7. Late answer sheets will most definitely be rejected.
8. 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

<b>A company is considering the purchase of a new truck for its expanding landscaping business. The key parameters of the three trucks under scrutiny (Alpha, Beta and Gamma) are provided below.</b>			
<b><u>Computer Parameters</u></b>	<b><u>Alpha</u></b>	<b><u>Beta</u></b>	<b><u>Gamma</u></b>
<b>1. Initial Cost (\$)</b>	<b>600,000</b>	<b>750,000</b>	<b>800,000</b>
<b>2. Revenues (\$)</b>	<b>300,000 at EOY1 increasing by 3% annually thereafter.</b>	<b>450,000 at EOY1 decreasing by 2% annually thereafter</b>	<b>430,000 at EOY1 increasing by 2,000 annually thereafter</b>
<b>3. Operating Costs (\$)</b>	<b>130,000 at EOY1 increasing by 5,000 annually thereafter.</b>	<b>255,000 at EOY1 increasing by 2% annually thereafter</b>	<b>280,000 at EOY1 increasing by 1,000 annually thereafter</b>
<b>4. End-of-life salvage value (\$)</b>	<b>15,000</b>	<b>10,000</b>	<b>5,000</b>
<b>5. Useful life (years)</b>	<b>5</b>	<b>10</b>	<b>10</b>
<ul style="list-style-type: none"> <li>• <b>Industry Standard = 4 years</b></li> <li>• <b>MARR = 10%</b></li> </ul>			

1. Alpha's Net Future Worth (NFW) after 5 years (rounded to the nearest \$100) is  
a) \$99,600; b) \$116,900; c) \$125,400; d) \$133,600
2. Beta's NFW after 10 years (rounded to the nearest \$100) is  
a) \$285,100; b) \$325,200; c) \$388,900; d) \$394,100.
3. Gamma's Net Present Worth (NPW) (rounded to the nearest \$100) is  
a) \$133,400; b) \$136,900; c) \$146,900; d) \$172,500.
4. Alpha's Annual Equivalent Worth (AEW) (rounded to the nearest \$100) is  
a) \$21,900; b) \$23,300; c) \$23,400; d) \$24,300.
5. Beta's Annual Equivalent Worth (AEW) (rounded to the nearest \$100) over 20 years (it was repeated several times) is  
a) \$18,800; b) \$19,000; c) \$19,100; d) \$20,400.
6. The best truck based on the NPW method is  
a) Alpha; b) Beta; c) Gamma.
7. Based on the simple payback method, Gamma's recovery period (to the nearest half or full year) is

- a) 3.5 years; b) 4.5; c) 5.5; d) 6.0.
8. Based on the simple payback method, Beta's project balance after 2 years (rounded to the nearest \$100) is  
a) \$-374,100; b) \$-347,000; c) \$-249,900; d) \$154,300.
9. Based on the discounted payback method, Gamma's recovery period (to the nearest half or full year) is  
a) 7.0 years; b) 7.5; c) 8.0; d) 9.5.
10. Based on the discounted payback method, Alpha's project balance after 2 years (rounded to the nearest \$100) is  
a) \$-412,700; b) \$-404,300; c) \$-365,000; d) \$100,800.
11. Based on the discounted payback method, Gamma's project balance after 3 years (rounded to the nearest \$100) is  
a) \$-565,200; b) \$-535,000; c) \$-495,700; d) \$175,900.
12. Beta's benefit/cost (B/C) ratio (second decimal; no rounding) is  
a) 0.98; b) 1.05; c) 1.10; d) 1.12.
13. Gamma's benefit/cost (B/C) ratio (second decimal; no rounding) is  
a) 0.98; b) 1.03; c) 1.05; d) 1.12.
14. The incremental B/C ratio (second decimal; no rounding) between Alpha and Beta is  
a) 0.98; b) 1.05; c) 1.11; d) 1.16.
15. The incremental B/C ratio (second decimal; no rounding) between Beta and Gamma is  
a) 0.95; b) 1.22; c) 1.28; d) 1.34.
16. Beta's Internal Rate of Return (IRR) (second decimal; no rounding) is  
a) 13.35%; b) 14.55%; c) 15.22; d) 15.39%.
17. Gamma's Internal Rate of Return (IRR) (second decimal; no rounding) is  
a) 12.88%; b) 13.17%; c) 13.64%; d) 14.06%.
18. The incremental Internal Rate of Return ( $\Delta$ IRR) between Alpha and Gamma (second decimal; no rounding) is  
a) 10.95%; b) 11.29%; c) 11.68%; d) 11.87%.
19. Alpha's External Rate of Return (ERR) (second decimal; no rounding) is  
a) 12.88%; b) 13.38%; c) 13.86%; d) 14.17%.
20. Beta's External Rate of Return (ERR) (second decimal; no rounding) is

- a) 11.15%; b) 11.71%; c) 11.98%; d) 12.17%.
21. The incremental External Rate of Return ( $\Delta$ ERR) between Alpha and Gamma (second decimal; no rounding) is  
a) 10.40%; b) 10.75%; c) 10.95%; d) 11.12%.
22. The incremental External Rate of Return ( $\Delta$ ERR) between Beta and Gamma (second decimal; no rounding) is  
a) 10.49%; b) 10.80%; c) 11.28%; d) 11.73%.
23. Is Gamma an acceptable project based on the discounted payback method?  
a) Yes; b) No; c) Impossible to determine its acceptance from the cash flow information provided.
24. Must the present worth and the discounted payback methods come to the same conclusion as to the acceptance of a project?  
a) Yes; b) No.
25. If the company's truck purchase budget is \$1,500,000, which truck(s) should it purchase assuming that trucks are independent investments?  
a) Gamma only; b) Alpha and Beta; c) Alpha and Gamma; d) Beta and Gamma.
26. Hugo plans to make quarterly deposits of \$60 (beginning one quarter from today) to a savings account that pays 12% interest compounded annually. Which of the following answers would provide the balance of John's savings account after 3 years (i.e., after his 12<sup>th</sup> \$60 deposit)?  
a)  $FW=60(F/A, 12\%, 12)$  where FW = Future Worth  
b)  $FW=60(F/A, 12\%/4, 3)$   
c)  $FW=60(4)(F/A, 12\%/4, 36)$   
d)  $FW=60(4)(F/A, 12\%, 3)$

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<b>DISCRETE CASH FLOWS AND DISCRETE COMPOUNDING</b>								
<b>10.00</b>			<b>% DISCRETE RATE OF INTEREST</b>					
<b>n</b>	<b>(F/P,i%,n)</b>	<b>(P/F,i%,n)</b>	<b>(A/P,i%,n)</b>	<b>(P/A,i%,n)</b>	<b>(A/F,i%,n)</b>	<b>(F/A,i%,n)</b>	<b>(A/G,i%,n)</b>	<b>(P/G,i%,n)</b>
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