

ENGINEERING ECONOMICS

Revised

Mac Snowplow: **Reverse revenue and cost information**

ECO 1192A

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 **WHITE 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 **ECO1192AW**. 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 17			
Paragon Township is studying the purchase of one of three mutually exclusive snowplows. Their estimated cash flows and other information are provided in this Table.			
	Snowplow Information		
Project Parameters	Star	Mac	Mega
1. Initial Cost (\$)	300,000	345,000	355,000
2. Annual revenues (\$)	\$130,000 EOY1 increasing by \$2,000 annually thereafter	<u>120,000</u>	145,000
3. Annual costs (\$)	50,000	<u>55,000</u> <u>EOY1</u> <u>increasing</u> <u>by 2%</u> <u>annually</u> <u>thereafter</u>	\$100,000 EOY1 decreasing by 5% annually thereafter
4. End-of-life salvage value (\$)	0	-5,000	4,000
5. Useful life (years)	5	10	10
6. Industry Standard	3 years		
Industry Threshold = 5 years; MARR = 10%			

1. Star's Annual Equivalent Worth (AEW) over 5 years (to the nearest \$100) is a) \$3,600; b) \$3,900; c) \$4,300; d) \$4,500.
2. Mac's AEW over 10 years (to the nearest \$100) is a) \$3,900; b) \$4,100; c) \$4,200; d) \$4,500.
3. Mega's AEW over 10 years (to the nearest \$100) is a) \$3,700; b) \$3,800; c) \$3,900; d) \$4,000.
4. Star's AEW over 20 years (to the nearest \$100) is a) \$3,600; b) \$3,700; c) \$4,500; d) \$9,300.
5. The best snowplow based on the AEW method is a) Star; b) Mac; c) Mega.

6. Based on the simple payback method, Star's recovery period (closest half or full year) is a) 2.5; b) 3.0; c) 3.5; d) 4.0.
7. Based on the simple payback method, Mac's recovery period (closest half or full year) is a) 3.5 years; b) 4.5; c) 5.0; d) 5.5.
8. Based on the simple payback method, Mac's project balance (nearest \$1,000) after 2 years is
a) -\$196,000; b) -\$209,000; c) -\$216,000; d) -\$219,000.
9. Based on the simple payback method, Mega's recovery period (closest half or full year) is a) 4.5 years; b) 5.0; c) 5.5; d) 6.0.
10. Based on the simple payback method, the best snowplow is
a) Star; b) Mac; c) Mega.
11. The incremental B/C ratio (nearest 1st decimal) between the Star and Mac snowplows is a) 0.8; b) 0.9; c) 1.0; d) 1.1.
12. The incremental B/C ratio (nearest 1st decimal) between the Star and Mega snowplows is a) 0.8; b) 0.9; c) 1.0; d) 1.1.
13. Star's External Rate of Return (ERR) (nearest 1st decimal) is
a) 9.9%; b) 11.2%; c) 11.69%; d) 12.1%.
14. Mac's ERR (nearest 1st decimal) is
a) 9.6%; b) 9.9%; c) 10.8%; d) 11.1%.
15. The incremental ERR between the Star and Mac snowplows (nearest 1st decimal) is a) 9.1%; b) 9.9%; c) 10.0%; d) 11.3%.
16. The incremental ERR between the Mac and Mega snowplows (nearest 1st decimal) is a) 9.9%; b) 10.1%; c) 10.4%; d) 10.7%.
17. The best snowplow based on the incremental ERR method is
a) Star; b) Mac; c) Mega.

QUESTIONS 18 to 40

- Owners of the Pleasant Rest Motel would like to provide their guests with state-of-the-art exercise facilities.
- Their “best guesses” of the parameters of the proposed facilities are:
 1. Initial Cost (P) = \$200,000
 2. Salvage value (SV) = \$1,113
 3. Annual operating revenues (AOR) = \$150,000
 4. Annual operating costs (AOC)= \$75,000
 5. Economic life (N) = 5 years
 6. MARR = 10%
 7. Inflation Rate = 0%
 8. Neither risk nor uncertainty.

Due to the lingering uncertainty underpinning these “best guesses”, you’ve been asked to perform a one-way sensitivity analysis.

<u>One-way Sensitivity Table</u>							
<u>Net Present Worth</u>							
<u>Parameters</u>	<u>-15%</u>	<u>-10%</u>	<u>-5%</u>	<u>Reference Scenario</u>	<u>+5%</u>	<u>+10%</u>	<u>+15%</u>
P	AA						BB
AOR	CC						DD
AOC	EE						FF
SV	GG						HH
N	II						JJ
MARR	KK						LL

18. The dollar value (nearest \$100) of cell AA is
a) 95,900; b) 100,500; c) 114,900; d) 115,000.
19. The dollar value (nearest \$100) of cell BB is
a) 55,000; b) 56,800; c) 66,700; d) 110,000.
20. The dollar value (nearest \$100) of cell CC in Table 1 is

- a) -400; b) -300; c) 100; d) 500.
21. The dollar value (nearest \$100) of cell DD is
a) 122,800; b) 135,000; c) 170,300; d) 174,700.
22. The dollar value (nearest \$100) of cell EE is
a) 117,900; b) 127,600; c) 131,700; d) 148,900.
23. The dollar value (nearest \$100) of cell FF is
a) 42,400; b) 43,900; c) 44,200; d) 44,700.
24. The dollar value (nearest \$100) of cell GG is
a) 66,000; b) 74,900; c) 84,600; d) 84,900.
25. The dollar value (nearest \$100) of cell HH is
a) 84,100; b) 85,100; c) 85,500; d) 86,100.
26. The dollar value (nearest \$100) of cell II is
a) 50,500; b) 50,600; c) 50,700; d) 110,000.
27. The dollar value (nearest \$100) of cell JJ is
a) 106,800; b) \$107,900; c) 117,100; d) 135,100.
28. The dollar value (nearest \$100) of cell KK is
a) 78,900; b) 79,000; c) 86,300; d) 96,300.
29. The dollar value (nearest \$100) of cell LL is
a) -21,800; b) 74,400; c) 75,100; d) 76,200.
30. The most influential parameter on the project's NPW in the -15% to +15% range is a) P; b) AOR; c) AOC; d) SV; e) MARR.
31. The second most influential parameter on the project's NPW in the --15% to +15% range is a) P; b) AOR; c) AOC; d) MARR; e) MARR.
32. The breakeven (NPW=\$0) dollar value (nearest \$1000) of the initial cost parameter (P) is a) 115,000; b) 285,000; c) 295,000; d) 310,000.
33. The breakeven (NPW=\$0) dollar value (nearest \$100) of the annual revenue parameter (AOR) is
a) 127,600; b) 135,600; c) 144,800; d) 145,700.
34. The breakeven (NPW=\$0) dollar value (nearest \$100) of the annual cost parameter (AOC) is
a) 92,200; b) 93,400; c) 97,400; d) 99,200.

35. The breakeven (NPW=\$0) dollar value (nearest \$100) of the salvage value parameter (SV) is
a) -159,600; b) -155,300; c) -135,800; d) -110,600.
36. The breakeven (NPW=\$0) duration (nearest 1st decimal) of the project is
a) 2.1 years; b) 3.2; c) 3.6; d) 3.8.
37. The breakeven (NPW=\$0) MARR (percentage to nearest 1st decimal) of the project is a) 10.0%; b) 13.8%; c) 20.4%; d) 25.5%.
38. You are asked to perform a scenario analysis instead of a sensitivity analysis. Assume that the values of the three scenarios (optimistic, most likely and pessimistic) are to be populated from values from the sensitivity tables shown above.

The dollar value of the project's initial cost (P) for the optimistic scenario would be a) 200,000; b) 200,000(1.15); c) 200,000(0.85).

39. You are asked to perform a scenario analysis instead of a sensitivity analysis. Assume that the values of the three scenarios (optimistic, most likely and pessimistic) are to be populated from values from the sensitivity tables shown above.

The dollar value of the project's annual operating cost (AOC) for the pessimistic scenario would be a) 75,000; b) 75,000(1.15); c) 75,000(0.85).

40. You are asked to perform a scenario analysis instead of a sensitivity analysis. Assume that the values of the three scenarios (optimistic, most likely and pessimistic) are to be populated from values from the sensitivity tables shown above.

The dollar value of the project's MARR for the optimistic scenario would be a) 10%; b) 10%(1.15); c) 10%(0.85).

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