E355 Engineering Economics Spring 2022
Homework #2

"I pledge my honor that I have abided by the Stevens Honor System"

By: Alexander Gaskins, Daniel Goldberg, and Samuel Gavrilov

2.1 NJ Transit is considering replacing part of their train fleet. They have narrowed their choices down to two alternatives.

Description	Automaker A	Automaker B
First Cost	$ 49,000,000	$ 40,000,000
Salvage value	$ 4,000,000	$ 5,000,000
Annual Benefit	$ 14,000,000	$ 13,000,000
Annual O&M Cost	$ 3,500,000	$ 4,000,000
Life	12	12
MARR	15%	15%

a) Calculate the PW for both the alternatives. (Do not use AW or FW) [6 point]

Automaker A:

PW = A (P/A, i, N)+F(P/F, i, N) - P

= 10,500(P / A,15,12) + 4,000(P / F,15,12) - 49,000
= 10,500(5.421) + 4,000(0.1869) - 49,000
= $8668.10

Automaker B:

PW = A (P/A, i, N)+F(P/F, i, N) - P

= 9,000(P / A,15,12) + 5,000(P / F,15,12) - 40,000
= 9,000(5.421) + 5,000(0.1869) - 40,000
= $9723.50

b) Calculate the AW for both the alternatives. (Do not use PW or FW) [6 points]

Automaker A:

AW = A + F(A/F, i, N) – P(A/P,i, N)

= 10,500 + 4,000(A/F,15,12) – 49,000(A/P,15,12)
= 10,500 + 4,000(0.0345) - 49,000(0.1845)
= $1597.50

Automaker B:

AW = A + F(A/F, i, N) – P(A/P,i, N)

= 9,000 + 5,000(A/F,15,12) – 40,000(A/P,15,12)
= 9,000 + 5,000(0.0345) - 40,000(0.1845)
= $1792.50

c) Calculate the FW for both the alternatives. (Do not use PW or AW) [6 points]

Automaker A:

FW = A(F/A, i, N) + F – P(F/P, i, N)

=10,500(F/A,15,12) + 4,000 - 49,000(F/P, 15, 12)
=10,500(29.002) + 4,000 - 49,000(5.350)
= $46,371.00

Automaker B:

FW = A(F/A, i, N) + F – P(F/P, i, N)

= 9,000(F/A,15,12) + 5,000 - 40,000(F/P, 15, 12)
= 9,000(29.002) + 5,000 - 40,000(5.350)
= $52,108.00

d) Which alternative should be chosen? Why? [2 point]

Automaker B, as it has a higher PW, AW, and FW than Automaker A.

2.2 StayPuff Marshmallow Company is trying to decide between three systems that are necessary in its manufacturing facility.

System	Installed Cost	Annual O&M	Salvage Value
A	$ 42,000	$ 32,000	$ 10,000
B	$ 26,000	$ 34,000	$ 8,000
C	$ 37,000	$ 33,000	$ 9,000

Assuming the system is expected to last and be used for 8 years and MMs has a minimum attractive rate of return (MARR) of 18%, which system should be purchased?

a) Calculate the EUAC for the System A. [2 points]

EUAC = P(A/P,i,n) – S(A/F,i, n) + O&M

= 42,000(A/P,18,8) - 10,000(A/F,18,8) + 32,000
= 42,000(0.2452) - 10,000(0.0652) + 32,000
= $41,646.40

b) Calculate the EUAC for the System B. [2 points]

EUAC = P(A/P,i,n) – S(A/F,i, n) + O&M
= 26,000(A/P,18,8) - 8,000(A/F,18,8) + 34,000
= 26,000(0.2452) - 8,000(0.0652) + 34,000
= $39,853.60

c) Calculate the EUAC for the System C. [2 points]

EUAC = P(A/P,i,n) – S(A/F,i, n) + O&M
= 37,000(A/P,18,8) - 9,000(A/F,18,8) + 33,000
= 37,000(0.2452) - 9,000(0.0652) + 33,000
= $41,485.60

d) Which system should be adopted? Why? [2 point]

For fixed output, minimize EUAC. System B has the smallest EUAC, so System B should be adopted.