

**Exam 4 Practice Problems  
For Engineering Economy**

**By**

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**The fixed costs for producing a certain item are \$200,000 per year. If the item sells for \$50 per unit and it has a variable cost of \$10 per unit, the number of units the company must sell each year to break even is:**

**Solution:**

$$-200,000 - 10x = -50x$$

$$x = 5000$$



**A decrease in tourism due to partial closure of a National Park would be considered as which of the following in a B/C analysis**

- (A) Cost**
- (B) Benefit**
- (C) Disbenefit**
- (D) Savings**

**Answer is (C)**

A regional school district is considering four sites for locating a new “super school”. The school has identified several advantages (B) and costs (C) with each site and has calculated their present worths (in millions) as shown below. Which site should be selected by the board, assuming that one of them must be selected (i.e. do-nothing is not an option).

PW of		PW of	
Site No.	Benefits	Benefits	Costs
1	12	10	(A) Site 1
2	8	14	(B) Site 2
3	4	3	(C) Site 3
4	21	24	(D) Site 4

Rank sites according to increasing cost and then compare them incrementally (do-nothing is not an option): Ranking = 3, 1, 2, 4

Site 3 vs 1

$$B/C = \frac{12 - 4}{10 - 3} = 1.14$$

Site 1 vs 2

Eliminate 3  
By inspection, site 2 has a higher cost and less benefits.

Eliminate 2

Site 1 vs 4

$$B/C = \frac{21 - 12}{24 - 10} = 0.64$$

Select Site 1

Eliminate 4

A construction company is evaluating whether it should replace a currently-owned piece of equipment now or at some time in the future. The company paid \$75,000 for the equipment five years ago. It can be sold now for \$20,000. If kept, it will have an operating cost of \$38,000 per year with a salvage value of \$5,000 after its remaining economic life of 7 more years. A new piece of equipment which will perform the same service can be purchased for \$90,000. It is expected to have an annual operating cost of \$25,000 per year with a salvage value of \$15,000 after its 10-year economic life. At an interest rate of 18% per year, should the company keep the existing equipment or replace it with the challenger?

**Solution:**

The economic values that should be used in the comparison are as follows:

<b>Defender</b>	<b>Challenger</b>
<b>P = 20,000</b>	<b>P = 90,000</b>
<b>AOC = 38,000</b>	<b>AOC = 25,000</b>
<b>SV = 5,000</b>	<b>SV = 15,000</b>
<b>n = 7 years</b>	<b>n = 10 years</b>

$$\begin{aligned} \text{AWD} &= -20,000 (\text{A/P}, 18\%, 7) - 38,000 + 5000 (\text{A/F}, 18\%, 7) \\ &= -20,000 (0.26236) - 38,000 + 5000 (0.08236) \\ &= -\$42,835 \end{aligned}$$

$$\begin{aligned} \text{AWC} &= -90,000 (\text{A/P}, 18\%, 10) - 25,000 + 15,000 (\text{A/F}, 18\%, 10) \\ &= -90,000 (0.22251) - 25,000 + 15,000 (0.04251) \\ &= -\$44,388 \end{aligned}$$

**Therefore, the company should keep the presently-owned equipment**