**Economics Homework 02**

**Problem 1**

We have the following two alternatives for a purification unit:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Initial Investment** | **Salvage Value** | **Service Life** | **Annual Operating Expenses** |
| A.) | $180,000 | $15,000 | 6 years | $25,000 |
| B.) | $210,000 | $20,000 | 8 years | $20,000 |

We have an annual interest rate of 20%, and we are using annualized costs.

*Alternative A –*

We need to solve for A, the annualized cost:

Salvage per year = $15,000/6 years = $2,500/yr

Cost per year:

54,127 + 25,000 – 2,500 = **$76,627/year spent.**

*Alternative B –*

We need to solve for A, the annualized cost:

Salvage per year = $25,000/8 years = $2,500/yr

Cost per year:

54,727 + 20,000 – 2,500 = **$72,227/year spent.**

Thus, Option B is the better option.

**Problem 2**

Renting v Buying –

Our income gives us enough money to save $10,000/yr and pay rent on a house at $12,000/yr including utilities. We also have an accumulated $20,000 in savings which earns interest at 4%. We can also buy a house for $134,000 and then incur the following costs:

* Taxes + Insurance: $2,000
* Maintenance: $1,600
* Utilities: $2,400
* Interest on Loan: 6% (on Principle)
* Income Tax Rate: %25

We can also assume that inflation increases the value of the house by 3% compounded annually.

*Rent –*

$12,000/year of rent for 4 years = $48,000.

How does our savings change?

F = 20,000(1 + 0.04) = 20,800 + 10,000

F = 30,800(1 + 0.04) = 32,032 + 10,000

F = 42,032(1 + 0.04) = 43,713.28 + 10,000

F = 53,713.28(1 + 0.04) = 55,861.88 in savings after four years.

This leaves us with a net of $7,861, which is taxed to achieve **$6,346** after paying all of our rent and income tax.

*House –*

House loan required = $134,000 - $20,000 = $114,000

The house appreciates for 4 years: F = $134,000(1 + 0.03)4 = $150,818.2

Interest is added to the loan to make the total payment come out to be:

$114,000(1 + 0.03)4 = $143,922.39

The total tax, insurance, and utilities cost:

(1600 + 2400 + 2000)\*4 = $24,000

From out income, we receive $22,000 per year for four years which equates to $88,000

150,818.2 + 88,000 – 143,922.37 – 24,800 = **$70,895**

Purchasing the house is clearly the better option.

**Problem 3**

To determine what costs can be spent on maintenance each year, we must find when the cost of buying milk solids is equal to the cost of buying a plant to create them. It currently costs $30,000/yr to buy the milk solids.

The following costs are associated with a milk solids plant:

* P­I­ = $100,000
* Pay over ten years
* 16% interest rate
* Land price = $10,000

We can use the following equation to calculate the annualized cost of the plant:

(Cost of buying Milk Solids) = (Cost of plant per year) + (cost of annual maintenance)

This, the maintenance costs can be:

30,000 – 22,759 = $7,341/yr

**Problem 4**

A company wants to purchase a plant for $350,000. This plant has a service life of 10 years, which provides annual sales of $500,000. The annual operating costs would be $300,000. The value of the land, equipment, buildings, etc. at the end of the 10 years is estimated to be $100,000. The company uses straight line depreciation. The tax rate is 47% and the required working capital is $50,000. The company requires a 25% after tax rate return. Is this an acceptable investment.

First, we will calculate the depreciation rate, m:

The total profit from the plant is the annual sales minus the annual expenses:

Profit =$500,000 - $300,000 = $200,000

The plant depreciates in value, so we are also losing $25,000/yr as well.

So the profit we get is actually $175,000/yr.

The net cash flow after taxes becomes 175,000(1-0.47) = $92,750/yr

TCI = FCI + WC

400,0000 = 350,000 + WC, so, WC = $50,000

The net return =

Thus, this is not an acceptable investment.